KUVEMPU UNIVERSITY

Revised syllabus

BCA, B. Sc (Computer Science) and BA (Computer Applications)

W.E.F 2019-20

DEPARTMENT OF P.G. STUDIES AND RESEARCH IN COMPUTER SCIENCE,

JANNASHAYADRI , SHAKARGHATTA

SHIMOGA, KARNATAKA

NEW SYLLABUS FOR B.Sc. (Computer Science)

(EFFECT FROM 2019-20)

Paper code	Semester	SUBJECT	Weekly hours	Internal marks	External marks	Practicals	Total
BSC1	I	CF &CP	4+3	10	50	40	100
BSC1	I	CF &CP	4+3	10	50	40	100
BSC2	II	DS	4+3	10	50	40	100
BSC3	III	DBMS	4+3	10	50	40	100
BSC4	IV	C++	4+3	10	50	40	100
		JAVA	4+3	10	50	40	100
BSC5	V	UNIX Programming	4+3	10	50	40	100
		Advanced JAVA	4+3	10	50	40	100
BSC6	VI	SE&CN	4+3	10	50	40	100

FIRST SEMESTER B.Sc (Computer science)

Computer Science -I

BSC-1 Computers Fundamentals and C Programming

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to Computer Systems: **10 hrs**

Definition of a Computer, History of Computers, Generations of Computers, types of computer – based on size and working principle, Block diagram of a Computer with functional units(explanation), Parts of a computer system, Information processing Cycle. Definition of software and hardware, types of programming languages, assembler, compiler, interpreter, linker, loader (Definitions only),number system – decimal, binary, octal and hexadecimal number, inter-conversion of decimal to binary and vice-versa. ASCII codes.Algorithm-definition, Characteristics, notations. Flowchart-definition, Symbols used in writing the flow-chart Writing an algorithm and flow-chart of simple problems.

Unit 2- Introduction to Computer Systems: **10 hrs**

Introduction to C, features ofC , basic C program structure, character set, tokens, keywords and identifiers. Constants, variables, data types, variable declaration, symbolic constant definition.

Unit 3- Operators and Expressions: **08 hrs**

C operators- arithmetic, relational, logical, bitwise, assignment, increment and decrement, conditional (?:) and special operators, Arithmetic expressions, precedence of operators and associatively. Type conversions, mathematical functions.Definition of macro and pre-processor directives, Managing I/O operation – reading and writing a character, formatted and unformatted/O functions.

Unit 4- Control Structures: **10 hrs**

Conditional control statements- if, if-else,nested-if,switch , go to statement, while, do-while and for statements. Unconditional control statements- break, continue and return statements(definition and explanation with syntax, flowchart and examples)

Unit 5- Arrays, Strings and Functions: **10 hrs**

Definitions of an array, types-one and two dimensional array,(definition, declaration, initialization with examples).Strings–definition, declaration and initialization of string variable, string handling functions- strcmp,strcpy, strrev, strlen, strlwr, strupr(explanation with syntax and examples) Functions – definition, need, syntax for function declaration, function prototype, category of functions, nesting offunctions, function with arrays, scope of variables ,parameter passing mechanism-call by value and call by reference. Recursion and Recursive function(definitions only)

Reference :

1. Fundamentals of Computers, V. Rajaraman.

2. Computer Concepts and C Programming, P.B. Kotur

3. Let us C ,YashwanthKanetkar

4. ANSI C, Balagurusamy

QUESTION PAPER PATTERN FOR I SEMESTER B.Sc(Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: C- PROGRAMMING LAB

1. Find the biggest of three numbers.
2. Arithmetic operations using switch statement.
3. Find the Fibonacci series between M and N.
4. Prime numbers between M and N
5. Binary to Decimal conversion
6. Sorting an unsorted array
7. Searching an element in an array.
8. Addition of two matrices
9. Multiplication of two matrices
10. Norm and trace of the matrix.
11. Count the numbers of vowels in a given string.
12. Find the factorial of a number using function.

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Flowchart/Algorithm 05 Marks
- ✓ Program Writing 15 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

SECOND SEMESTER B.Sc (Computer science)

Computer Science -II

BSC-2 DATA STRUCUTRES USING C

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to Data Structure: **10 hrs**

Definition of Structure, syntax and example for structure declaration.Definition of union, syntax and example for union declaration, difference between structure and union.Pointers–Definition, Declaration, Examples. Dynamic memory allocation functions – syntax and examples. Definition of Data Structure and types of data structures with examples.

Unit 2 – Stack and recursion: **10 hrs**

Definition and example of stack (LIFO), operations of stack with algorithms, applications of stack, algorithm for the conversion of infix to postfix expression. evaluation of postfix expression , Tower of Hanoi problem and factorial of a number using recursion.

Unit 3- Queue: **10 hrs**

Definition and example of Queue (FIFO), operations on queue, types of queue – ordinary queue and circular queue (definitions only), disadvantages of ordinary queue. Linked list–Definitions and types of lists (definitions only), operations of Single Linked List, implementation of stack using linked list, implementation of queue using linked list,

Unit 4- Tree : **10 hrs**

Definition of a Tree, Definition of root, left sub tree, right sub tree, degree of node, terminal node, depth, Definition of Binary tree, types of binary trees (definition only), Algorithm for tree traversal.

Unit 5- Sorting and searching: **08 hrs**

Definition of sorting, explanation of bubble sort, shell sort, radix sort and merge sort with examples. Definition of searching, explanation of Binary search and linear search with examples and algorithms.

References:

1. Systematic approach to data structure - Padmareddy
2. Programming in ANSI C - E Balaguruswamy
3. Datastructures and applications - Trembly and Sorenson

QUESTION PAPER PATTERN FOR II SEMESTER B.Sc(Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: DATA STRUCUTRES LAB

1. Implementation of stack
2. Evaluation of postfix expression
3. Conversion of infix to postfix
4. Tower of Hanoi
5. Implementation of queue
6. Implementation of stack using linked list
7. Implementation of queue using linked list
8. Quick sort
9. Shell sort
10. Binary search

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
  - ✓ Program Flowchart/Algorithm 05 Marks
  - ✓ Program Writing 15 Marks
  - ✓ Correct output with proper display 10 Marks
    (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

THIRD SEMESTER BSc (Computer science)

Computer Science -III

BSC-3OBJECT ORIENTED PROGRAMMING WITH C++

Theory Examination- 50 Max marks. Number of Teaching hours –48

Internal Assessment- 10 Max marks

Unit 1- Introduction to OOPS: 10 hrs

Object Oriented Programming paradigm, Basic concepts of Object Oriented Programming- Classes, Objects, Data Abstraction and Encapsulation, Polymorphism, Inheritance, Dynamic Binding, Message passing, Benefits of OOP, applications of OOP.

Unit 2-Introduction to C++: 10 hrs

Difference between C and C++, Structure of a C++ program, input and output statements, tokens - Keywords, identifiers, constants, strings and operators, reference variables – definition and example, special operators in C++, brief introduction to control structures in C++.

Unit 3-Classes Objects and Member Functions: 10 hrs

Difference between structure and class, syntax and example for class declaration, Definition of data member and member function, Defining member function inside and outside the class, inline functions, array of objects, default arguments, static data members and static member functions, function overloading, definition of friend function, syntax and example for the declaration of friend function, special characteristics of friend function.

Unit 4- Constructors, destructorsand Operator overloading: 09 hrs

Definition of a constructor, types - parameterized constructor, default constructor, copy constructor, special characteristics of constructor, definition of a destructor, special characteristics of destructor, definition to Operator overloading, overloading binary operator (+) to add two complex numbers, rules for operator overloading.

Unit 5: Inheritance and templates: 09 hrs

Definition of Inheritance,forms of inheritance, syntax and example for defining derived classes, visibility modes, explanation of multilevel inheritance and hybrid inheritance with examples. Definition of templates, syntax and example for class and function template.

Reference Books:

1. Object Oriented Programming with C++ - E Balaguruswamy
2. C++ - The Complete Language – BjarneSchildt
3. Object Oriented Programming in Turbo C++ - Robert Lafore

QUESTION PAPER PATTERN FOR III SEMESTER B.Sc (Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: C++ LAB

1. Write a c++ program to find the result of a student using class concept
2. Define a class to represent product details it includes data member pname, pcode, price, pquality include member function a) to get product detail b) to display the product details and total price using class concept
3. Write a c++ program to print Fibonacci series using constructor
4. Write a c++ program to find biggest of two numbers and three numbers using function overloading
5. write a c++ program to calculate area of triangle, rectangle and circle using function overloading
6. write a c++ program to calculate family income using friend function
7. write a c++ program to add two complex numbers using operator overloading
8. write a c++ program to implement multiple inheritance by creating classes: father , mother and son
9. write a c++ program to swap two numbers using function template
10. write a c++ program to sort an array using function template

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
  - ✓ Program Flowchart/Algorithm 05 Marks
  - ✓ Program Writing 15 Marks
  - ✓ Correct output with proper display 10 Marks
    (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

FOURTH SEMESTER B.Sc (Computer science)

Computer Science -IV

BSC-4 DATABASE MANAGEMENT SYSTEM

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to DBMS: **10 hrs**

Meaning of data and information, definitions of database, applications of database system, definition of DBMS, disadvantages of file processing system (advantages of DBMS), three levels of data abstraction, difference between schema and instance, definition of data models, types of data models (brief explanation), database languages – DDL and DML.

Unit 2- E-R model: **10 hrs**

Different types of database users, functions of Database Administrator (DBA), basic-concepts - Primary keys, foreign key, super key, definition of E-R diagram, symbols used in E-R Diagram, E-R diagram for Banking enterprise, E-R diagram for Book store, types of entities, entity sets, attributes, types of attributes, weak entity sets, cardinality ratios (mapping cardinality).

Unit 3- Relational Model: **10 hrs**

Fundamental operations of Relational algebra - select, project, union, set difference, join, division operations (explanation with examples). Types of aggregate functions – MAX, MIN, SUM, COUNT and AVERAGE (Definition with example).

Unit 4- SQL: **09 hrs**

Definition of Query, explanation of basic structure of SQL – Select, from and where clauses in SQL, data types in SQL, explanation of set operation in SQL – Union, intersection, except, NULL values.

Unit 5: Relational database design: **09 hrs**

Pitfalls in relational database design, definition of Normalization, Various types of Normal forms (Definitions only) – First Normal form, Second Normal form, Third Normal form, Boyce-Codd Normal Form (BCNF).

Reference Books:

1. Korth, Sudarshan “Database System concepts”, Mcgraw Hill-IV Edition.
2. Navathe, Silberchatz and Elmasri “fundamentals of database Systems”-Addison Wesley
3.C.J. Date “Introduction to Database systems” Addison-wesley.
4. Bipin C Desai “Introduction to Data base system” Galgotia publications

QUESTION PAPER PATTERN FOR IV SEMESTER B.Sc (Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: SQL LAB

I. Use default emp and dept tables to write SQL statements for followingqueries
1. Find the employee details in ascending order of their name and descending order of their salary
2. Find names of all employees whose name starts with ‘s’ and having atleast 6 characters in it
3. Find the name of all managers and number of employees under them
4. Find the details of all employees in the research department
5. Find the minimum, maximum and average salary of each department
6. Find department name having least number of employees
7. Find the department name having highest annual payroll
8. Add an employee under the manager smith
9. Find the employees who are not getting commission

II. Create tables as below
Student(name string, regno string primary key, dob date, doj date ,course string foreign key)
Markscard(regno foreign key, sem string, sub1 number, sub2 number, sub3 number, tot number, avge number, result string)
Write SQL statements for the following queries.
1. List the names of students studying in BCA course in the order of their joining
2. Find the name of student who has scored highest marks in every sem of each course
3. Count the number of students in each course
4. Find the course having second highest number of students
5. Find the course having least students in I semester
6. Raise marks of sub3 in III sem BCA students by 5% if the student has failed in that subject
7. Display the details of student ‘xxx’ in every semester.
8. Find the names of al juniors of ‘yyy’ in course ‘c1’
9. Find all students studying with ‘xxx’ and elder to him (compare DOB)

III. Dept(deptno integer pkey, dname string not null, loc string not null)
Emp(eno integer pkey, ename string, deptnofkey, desgn string not null, bsal number>0)
Salary(enofkey,da,hra,gross,it,pf,net,comm)
Designations are: manager,clerk,salesman
Comm=5% of basic if desgn=salesman otherwise null
Da=15% bsalhra = 7% of bsal gross=bsal+da+hra
It =0 if gross<15000
= 10% of gross if gross between 15000 and 30000
=20% of gross if gross between 30000 and 50000
= 30% of gross otherwise
pf = 10% of gross or 1000 whichever is less
Write SQL statements for
1. Count the number of employees in every designation
2. List the employees of every department in descending order of their net salary
3. List the name and salary of highest salary payer in every department
4. List the name of employee paying highest IT
5. List the total IT paid by each department
6. List the departments in every location
7. Raise the basic salary by 10% for the managers of every department.
8. Find number of employees having at least 10 years of experience in every department.
9. Count the number of employees who are not getting commission in every department

PRACTICAL EXAM SCHEME

Practical Proper - 30 Marks
Table creation & data insertion =10 marks
SQL queries- 4 X 5 marks =20 marks[Queries writing 3 marks (each) and Execution 2 marks (each)]
Viva – voce - 05 Marks
Record - 05 Marks

FIFTH SEMESTER BSc (Computer science)
Computer Science -V

BSC-5.1 JAVA PROGRAMMING

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to Java: **12 hrs**

History of Java, Java features, Difference between C/C++ and Java, Java program structure, Java tokens, Statements, JVM, Java and Internet, Java and WWW, Web browsers, Java support system, Java Development Kit (JDK), Application Programming Interface(API), Java Runtime Environment (JRE).Introduction to packages in Java, Applets, Operators & Expressions, Data types, Constants and Variables, Type conversions, Mathematical functions; Control Statements: Decision making and Branching with while, do-while, for and labeled loops; Arrays, Vectors & Strings: Initialization, Declaration

Unit 2-Overview: **10 hrs**

Class, Objects, Constructor, Method overloading, Static members; Inheritance: Single, Multilevel, Hierarchical, Visibility modes, Method overriding, Final variable, Abstract methods and classes; Interface: Defining, Extending and implementing assigning interface variables

Unit 3-Packagesand multithreading: **10 hrs**

Java API Packages, using system packages, naming convention, accessing and using a package, adding a class to packages, hiding classes. Multithreaded programming: Creating a thread, extending the thread class, stopping and blocking a thread, life cycle of a thread, using thread methods, thread exceptions, thread priority, synchronization, implementing the runnable interface.

Unit 4-Exceptions and Debugging: **08 hrs**

Meaning of errors and exceptions, Dealing with errors, Classifications of exceptions, syntax of handling exceptions, advertising the exceptions, throwing and re-throwing exceptions, creating Exception classes, multiple catch statements, finally clause, Debugging techniques – tricks for debugging, Assertions, Java Debugger (JDB).

Unit 5-Applets and Graphics: **08 hrs**

Applets basics, applets and application, Life cycle, Life cycle of Applet programming- passing parameter to applets, paint and repaint methods, Graphics class, Line, Rectangle, Circle, Ellipse, Arcs and Polygon, drawing bar charts.

Reference Books:

1.Programming with Java- A primer, 4th Edition, by E Balaguruswamy.
2.The Complete Reference – Patrick Naughton and Schildt
3.Programming in Java – Joseph L Weber

QUESTION PAPER PATTERN FOR V SEMESTER B.Sc (Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: JAVA PROGRAMMING LAB

1. Write a Java program to generate first n odd numbers and pick and display prime numbers among them. Read value for n as command line argument.
2. Write a Java program to create a vector, add elements at the end, at specified location onto the vector and display the elements. Write an option driven program using switch…case.
3. Write a java program to find area of geometric figures using method overloading.
4. Write a Java program to find the circumference and area of the circle using interface.
5. Write a java program to sort the alphabets in the given string.
6. Write a java program to accept student information using array of objects and constructor initialisation.
7. Write a java program to implement constructor overloading by passing different number of parameter of different types.
8. Write a program to implement an applet by passing parameter to HTML
9. Write an applet program to display human face
10. Create an applet to display concentric n circles, input value for n.

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Flowchart/Algorithm 05 Marks
- ✓ Program Writing 15 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

FIFTH SEMESTER BSc (Computer science)

Computer Science -VI

BSC-5.2 UNIX PROGRAMMING

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1.Introduction to Operating system: 10hrs

Definition of OS, functions of operating systems. Early systems – Simple monitors, Batch Systems, Multiprogramming, Time Sharing, Real time, Parallel and Distributed systems Scheduling concepts, Scheduling algorithms: FCFS, Shortest job first, priority scheduling, round robin, Definition of deadlock problem, deadlock characteristics, deadlock prevention and avoidance. File concept –allocation and access methods, directory structures, Contiguous allocation.

Unit 2- Introduction to Unix : 08 hrs

The Unix operating system, , A brief Session, The Unix Architecture, Features of UNIX, POSIX and Single UNIX specification, Locating commands, Internal and External commands, Command Structure, Flexibility of command Usage, Man Browsing the Manual Pages ON-line, Understanding the man Documentation. General-Purpose Utilities: Cal command, date command, echo, printf, bc, script, passwd, who, uname

Unit 3- The File System in Unix: 10 hrs

The file, The Parent –Child Relationship, The HOME Variable, pwd, cd, mkdir, rmdir, Absolute Pathname, Relative Pathname, ls, The Unix File system. Handling Ordinary Files: Cat, cp, rm, mv, more, Thelp subsystem: Printing a File, File, wc, od, cmp, comm, diff, dos2unix and unix2dos, compressing and archiving files, gzip, and gunzip, tar, zip and unzip. Basic File Attributes: Listing file attributes, listing directory attributes, File Ownership, File Permissions, changing file permissions, Directory Permissions, Changing File Ownership

Unit 4-The Vi Editor 10 hrs

Vi basics, Input Mode, Saving Text and Quitting, Navigation, Editing Text, Undoing Last Editing Instructions(U and U), Repeating the last command(.), Searching for a Pattern(/ and ?), Substitution

Unit 5-The Shell 08 hrs

The shell's Interpretive Cycle, Shell Offering, Pattern Matching, Escaping and Quoting, Redirection, /dev/null and /dev/tty, Pipes, tee, Command Substitution, Shell variables. Essential shell programming: Shell scripts, read, using command line arguments, exit and exit status of command, the logical operators && and ||- conditional execution, the if conditional, using test and to evaluate expressions, the case conditional, expr, $0: calling a script by different names, while, for, set and shift, the here document (<<), trap, debugging shell scripts with set –x, sample validation and data entry scripts.

Reference Books:

1. Sumitabha Das, UNIX System V.4, Concepts and Applications, TMH.
2. Operating systems concepts, Korth

QUESTION PAPER PATTERN FOR V SEMESTER B.Sc(Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: UNIX PROGRAMMING LAB

1.Write a shell script program to perform all arithmetic operation on floating point.
2.Write a shell script program to check whether the given number is positive or negative.
3.Write a shell script program to reverse a number.
4.Write a shell script program to find sum of digit of a number.
5.Write a shell script program to find the sum of the series (sum= 1 + ½ + ... +1/n)
6.Write a shell script program to add, subtract and multiply the two given number passed as command line argument.
7.Write a shell script to count number of characters in a given string
8.Write a shell script program to read pattern and file name and search whether the given pattern in a file or not.
9.Write a shell script to read filename from command line argument check whether the file is regular file or directory or by both.
10.Find the number of directory file and ordinary files in the current

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Flowchart/Algorithm 05 Marks
- ✓ Program Writing 15 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

SIXTH SEMESTER BSc

Computer Science -VII

BSC-6.1 ADVANCED JAVA PROGRAMMING

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1-Review of Java Concepts and AWT, Graphics Programming: 10 hrs

Review of Java Concepts .AWT and AWT Classes, Window fundamentals – Component, Container, Panel, Window, Frame, Canvas.Working with frame window. GraphicsProgramming: Graphics class, methods, drawing objects, line graphs, polygon classes,working with colours and fonts. Advanced graphics operations using Java2D.Designing,simple User Interfaces (UIs) using AWT, Layout Manages.

Unit 2- Swings and event handling: 10 hrs

Event Handling: Basics of Event Handling, the delegation event model, AWT event hierarchy and event classes, Event Listener Interfaces, Adapter Classes, Event queue. Swing: Meaning, need, difference between AWT and swing. The Model-View-Controller (MVC) designpatterns, Creating simple UIs using swing, and handling basic events.

Unit 3-Java Beans, Java Archives (JAR): 08 hrs

Meaning and need of Java Beans, Advantages, Bean writing process, Bean properties. Java Archives (JARs): Meaning, need, the JAR utility, Creating JAR files.

Unit 4-File Management and JDBC: 10 hrs

File, creating a file, writing to a file, opening a file, reading from a file, file management, checking existence of a file, deleting a file.JDBC: Meaning, need, concept and structure of JDBC, relation with ODBC, JDBC driver types and their meaning, the JDBC process – loading the driver, connecting to the DBMS, creating and executing SQL statement, Connection object, Statement object, Prepared Statement object, Callable Statement, Result Set, JDBC Exceptions.

Unit 5-Basic concepts of Collections, Generics and Network programming: 10 hrs

Collections: Meaning, need, Collection interfaces, Concrete Collections – Array List, Hash set, Map. Generics: Meaning, need, benefits, generics usage, basics of generic types, type parameter naming conventions, type wildcards, using type wildcards, generic methods, bound types, writing simple generic container, implementing the container, implementing constructors, implementing generic methods.

References:

1.Complete Reference – Java 2:Herbert Schildt, 5th / 7th Edition, Tata McGraw-Hill
2.Thinking in Java: Bruce Eckel
3. Core Java 2: Volume I – Fundamentals: Cay S. Horstmann, Gary Cornell, Pearson Education Asia.
4.Core Java 2: Volume II – Advanced Features: Cay S. Horstmann, Gary Cornell

QUESTION PAPER PATTERN FOR B.Sc(Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: ADVANCED JAVA PROGRAMMING LAB

1. Write an applet to add, remove, select an item in a list
2. Write an applet to display selected geometric figure from a list.
3. Write a program to implement mouse events
4. Write a program to implement keyboard events
5. Write a Java program (console) to store the typed text to a file.
6. Write a Java program to display the content of a file.
7. Write a Java program with JDBC to store the details of a person on to an Oracle database table.
8. Write a Java program with JDBC to access and display the details of a person stored in an Oracle database table.
9. Write a Java program with JDBC to access and delete the details of a given person stored in an Oracle database table.
10. Write a Java program to demonstrate the use of generics.

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
  - ✓ Program Flowchart/Algorithm 05 Marks
  - ✓ Program Writing 15 Marks
  - ✓ Correct output with proper display 10 Marks
    (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

SIXTH SEMESTER BSc

Computer Science -VIII

BSC-6.2 SOFTWARE ENGINEERING AND COMPUTER NETWORKS

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to Software Engineering: **10 hrs**

IEEE definition of Software and Software Engineering, Software Problems, Software engineering challenges, Software quality attributes, phases in software development (Phased Development process), Definition of Software process, Components of software process, desired characteristics of software process, Software development process models- waterfall model, prototype model and spiral model .

Unit 2- Software design: **09 hrs**

Definition of SRS, need for SRS, Characteristics of SRS, Structure of SRS, design objectives ,design principles, module level concepts – coupling and cohesion.

Unit 3- Coding and testing : **09 hrs**

Definition of Coding, Programming principles and guidelines, top down and bottom-up Approaches, definition of testing, testing fundamentals, levels of testing, Difference between black box testing and white box testing.

Unit 4-Introduction to Computer networks Network Hardware: **10 hrs**

Definition of computer network, Goals of computer network, Types of Networks based on transmission technology - Broadcast, point- to -point, Types of Networks based on size & scale - LAN, WAN, MAN, Protocol hierarchies (Network software), Network topologies – Bus, Mesh, Ring, tree and star.

Unit 5- Network Software, Reference models and Transmission Media: **10 hrs**

Reference models - OSI / ISO model, TCP / IP model, ARPANET,Transmission Media - twisted pair, coaxial cable, fiber optics cable, Internet and its applications, Wireless media - Bluetooth, Wi-Fi, internet and its applications

References:

1. An integrated approach to Software Engineering: PankajJalote.

2. Software Engineering a practitioners approach: Roger Pressman.

3. Computer Networks:5th Edition, Andrew S Tanenbaum.

QUESTION PAPER PATTERN FOR B.Sc(Computer science)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: PROJECT LAB

PROJECT LAB EXAM SCHEME

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories. The project is of 3 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The Project work should be either an individual lone or a group of not more than five members.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and process logic
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future application

The examiner will evaluate the project work as follows:

- Project Report - 10 Marks
- Project Demo - 10 Marks
- Viva-Voce - 20 Marks

KUVEMPU UNIVERSITY

Revised syllabus

BCA, B. Sc (Computer Science) and BA (Computer Applications)

W.E.F 2019-20

DEPARTMENT OF P.G. STUDIES AND RESEARCH IN COMPUTER SCIENCE,

JANNASHAYADRI , SHAKARGHATTA

SHIMOGA, KARNATAKA

Regulations for BCA course

Eligibility for Admission

1. A candidate who passed the three year Diploma in the branch of computer science, examination conducted by the board of Technical education, Government of Karnataka, shall be eligible for admission to first semester of BCA degree course.

2. A candidate who passed the two-year Pre-University examination in science/commerce of Karnataka state or any other examination considered as equivalent are eligible for admission to the first semester of BCA degree course.

3. A candidate who passed the three year Diploma in the branch of computer science, examination conducted by the board of Technical education, Government of Karnataka, shall be eligible for Lateral admission to the Third semester of BCA degree course.

4. Computational Mathematics-I and II Subjects should be taught by Computer Science Faculty

NEW SYLLABUS FOR BCA (EFFECT FROM 2019-20)

Semester	Paper	No of Hours (Theory)	No of Hours (Practical)	IA	External
I	English	4	-	20	80
	Kannada / Hindi/ Sanskrit/ Urdu	4	-	20	80
	Computational Mathematics - 1	4	-	20	80
	Computer Fundamentals	4	-	20	80
	Introduction to Information Technology	4	-	20	80
	Programming Fundamentals & C-Programming	4	-	20	80
	Excel & C Lab	-	3	20	80
	TOTAL			**140**	**560**
II	English	4	-	20	80
	Kannada/Hindi/ Sanskrit/ Urdu	4	-	20	80
	Computational Mathematics - 2	4	-	20	80
	C & Linear Data Structures	4	-	20	80
	Database Management System – 1	4	-	20	80
	Digital Fundamentals	4	-	20	80
	DS & Advanced Excel Lab	-	3	20	80
	TOTAL			**140**	**560**
III	English	4	-	20	80
	Kannada / Hindi/ Sanskrit/ Urdu	4	-	20	80
	Non Linear Data Structures using C++	4	-	20	80
	Database Management System – II	4	-	20	80
	System Software	4	-	20	80
	DS Lab Using C++	-	3	20	80
	SQL Using MYSQL	-	3	20	80
	TOTAL			**140**	**560**
IV	English	4	-	20	80
	Kannada / Hindi/ Sanskrit/ Urdu	4	-	20	80
	Java	4	-	20	80
	PL/ SQL and Data Warehousing	4	-	20	80
	Software Engineering	4	-	20	80
	Java Lab	-	3	20	80
	PL/ SQL & DW Lab	-	3	20	80
	TOTAL			**140**	**560**
V	Advanced programming in java	4	-	20	80
	Web Programming	4	-	20	80
	Operating System	4	-	20	80
	Data Communication	4	-	20	80
	Computer Networks	4	-	20	80
	Advanced java Lab	-	3	20	80
	Web Programming Lab	-	3	20	80
	TOTAL			**140**	**560**
VI	Unix Operating System	4	-	20	80
	. Net Programming	4	-	20	80
	Elective - 1 Digital Image Processing / Cloud Computing	4	-	20	80
	Elective – 2 Computer Graphics/Operation Research	4	-	20	80
	Unix & Net Lab	-	3	20	80
	Project Lab	-	3	20	80
	TOTAL			**120**	**480**

BCA - 1.3 : Computational Mathematics - 1

PART- A

Unit-1 Sets, Relations and Functions 12 hrs

Definition of a set, sub-set with examples, Venn diagrams, types of sets-equal sets, null set, disjoint sets, finite set, infinite set, power set, cardinality of set. Operations on sets-union and intersection of two sets, complement of a set, difference of two sets, symmetric difference of sets. Algebraic properties of set operations, strings and regular expressions. Definition of a relation with examples, types of relations-empty, universal, trivial, equivalence, reflexive, symmetric, transitive relation (definition and examples only, no problems). Definition of a function with examples, types of function, one-to-one (injective).Binary operation - commutative, associative, identity and invertible (definition and examples only, no problems).Functions for computer science - characteristic function, floor function and ceiling function.

Unit-2 Logic and Reasoning 12 hrs

Definition of proposition or statement, proposition variables, negation of statements, truth table, conjunction, disjunction, implications quantifiers- predicate, universal quantifier, universal quantification, existential quantification. Conditional statement/implication, contrapositive and converse, equivalence or bi conditional, tautology, contradiction, logical equivalence, properties of proposition operation-commutative, associative, distributive, idempotent negation. Simple problems on tautology and equivalence. Rules for validating statements

PART- B

Unit-3 Mathematical Induction and Counting 12 hrs

Principle of mathematical induction, simple problems on principle of mathematical induction. Fundamental principle of counting (statement with examples only), permutations-definition and simple problems. Combinations - definition and simple problems. Pigeon hole principle- statement and proof, extended pigeonhole principle- statement and proof.

Unit-4 Matrices and Determinants 12 hrs

Definition of matrix and order of matrix, types of matrices-column matrix, row matrix, square matrix, diagonal matrix, scalar matrix, identity matrix, zero matrix(definition and examples only, no problems),equality of matrices(definition and examples), simple problems on equality of matrices. Operations on matrices-addition, subtraction, product of two matrices, scalar multiplication of a matrix, inverse of a matrix, simple problems on these operations. Matrices applications in computer science.

Definition of determinant (definition and examples), determinant of matrix of order one , order two and order three(simple problems), properties of determinant(examples only, no verification),applications of determinants and matrices for solving the system of linear equations of two variables and three variables(simple problems),applications of determinant and matrices for checking the system of linear equations for consistency and inconsistency(simple problem).

Refences:

1. Text book of Mathematics – Shanthi Narayan

2. Text book of Mathematics – S. Lipschutz

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit3 and unit4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
3. Each question must contain sub-questions-(a),(b),…
4. The student has to attend any 05 full questions (16*5).
5. The student has to attend at least one question from each unit.

BCA 1.4 COMPUTER FUNDMENTALS

PART- A

Unit 1- Introduction to Computer Systems **12 hrs**

Definition of a Computer, History of Computers, Generations of Computers, classification Of Computers, Applications of Computer, Capabilities and limitations of computer. Block diagram of a Computer with functional units (explanation), Parts of a computer system with peripherals (explanation of peripherals), and essential computer hardware , Information processing Cycle. Input and output device**:** Input devices-key board mouse (explanation with diagram and working), output devices, monitors types of monitors, types of printers – line and page printers, laser printer – working, advantages and disadvantages. Representation of data, text code -EBCDIC, ASCII, UNICODE.

Unit 2 Computer Organisation & Storage Device **12 hrs**

Basic computer organization, bus Architecture and types .Primary Vs Secondary Storage, Primary Storage: RAM – SRAM, DRAM, SDRAM, DDR. ROM - PROM, EPROM, EEPROM, cache memory. Secondary Storage: Magnetic Tapes, Magnetic Disks. hard disks, Zip Drive, Flash Drives.

PART -B

Unit 3- MS Word and Power point **12 hrs**

MS Word**:** Working with documents, formatting documents, Setting page style and page layout, Creating Tables, Printing documents, Mail merging.

Power point**:** Introduction to presentation, Creating presentation, Formatting presentation, Adding effects to presentation, Printing Handouts.

Unit 4 –MS Excel **12 hrs**

Spread sheet and its applications, Data Formatting, Working with sheets, insertion and deletion of rows, columns and sheets, using formula in workbooks, creating charts, cell validation, filters.

References:

1. Computer fundamentals- V Rajaraman
2. Computer fundamentals- P B Kottur

GENERAL INSTRUCTIONS FOR PAPER SETTING

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5. The student has to attend at least one question from each unit.

BCA 1.5 INTRODUCTION TO INFORMATION TECHNOLOGY

PART- A

Unit 1-Software **12 hrs**

Definition of software, types of software - application software, general purpose and specific purpose, scientific and business software examples. System software - operating system, assembler, compiler, interpreter, linker, loader. Classification of programing languages - machine level, assembly level, high level languages, event driven, object oriented - advantage and disadvantages examples.

Unit 2. Computer Networks **12 hrs**

Definition, uses of network, applications of computer networks, types of network- point-to-point, broad cast, LAN, MAN, WAN network topology, introduction to different protocols (TCP/IP, SNMP, SMTP, FTP, HTTP, Telnet, ARP, DNS, Gopher, POP), network transmission Media (twisted pair, co axial, optical fiber), definitions of network interface card (NIC), Hub, Bridge, Switch, Router, Bandwidth, internet and its applications, understanding world wide web - how the web works, web browsers – examples, features, Telecommunication overview, Client server.

PART- B

Unit -3 E-Commerce **12 hrs**

Defining commerce , main activities of electronic commerce, benefits, goals, components, functions, process management, service management, transaction capabilities, types, scope.

Unit – 4 Introduction to clouds, big data and IOT **12 hrs**

Cloud- introduction, cloud computing at a glance. Vision of cloud computing, defining a cloud, characteristics, advantages, disadvantages, examples. Big Data – meaning, 3Vs in big data, challenges. IOT- meaning, compoonents, scope, IOT in education.

References:

1. Computer fundamentals- V Rajaraman
2. Computer fundamentals- P B Kottur
3. Mastering Cloud. Computing - RajKumarBuyya, Christian Vecchiola and ThamaraiSelvi
4. Ecommerce concepts and applications – NidhiDhavan

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
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BCA 1.6: PROGRAMMING FUNDAMENTALS & C

PART -A

Unit 1-Problem Solving Techniques: 12 hrs

Problem solving techniques – problem definition, analysis, design, debugging, testing, documentation and maintenance. Design Tools - ALGORITHM: definition, characteristics, advantages and disadvantages. FLOWCHART - definition, symbols, advantages and disadvantages. Writing an algorithm and flowchart : Area of circle, arithmetical operations, simple interest and compound interest, quadratic equation, largest of three numbers, sum of N natural numbers, factorial of number, Fibonacci series, prime number, reverse a given number, evaluation of series like sin(x), cos(x), e^x, log(x) etc.

Unit 2- C Basics 12 hrs

History of c-programming, Features, basic program structure, character set, tokens, keywords and identifiers. Constants, variables, data types, variable declaration, symbolic constant definition.

PART - B

Unit 3 - Operators 12 hrs

Arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise and special operators, Arithmetic expressions, precedence of operators and associatively. Type conversion(implicit and explicit) and mathematical functions. Managing I/O operations – reading and writing a character, formatted and unformatted I/O.

Unit 4- Decision making, branching and looping 12 hrs

Decision making - if and if-else statement, nested if, else if ladder, switch statements, conditional operator, goto statement. Looping - while, do-while and for, nested for. break and continue statements. Programs on these concepts.

References :

1. Computer Concepts and Programming, *Padma Reddy*
2. Let us C , Yashwanth Kanetkar
3. Ansi C, *Balagurusamy*
4. Problem solving with C, M. T. Somashekara and D. S. Guru

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit3 and unit4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
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5. The student has to attend at least one question from each unit.

BCA 2.3 - Computational Mathematics -II

PART -A

Unit 1 - Graph theory **12 hrs**

Definition of graph, graph as models, matrices and isomorphism, graph terminologies- definitions, properties and examples, Decomposition and special graphs. Paths, cycles and trails -connection in graphs, bipartite graphs, Eulerian circuits. Vertex, degree, bijections paths, cycles and trails-connection in graphs,

Unit 2 : Directed Graphs **12 hrs**

Definition of directed graph, properties and examples, vertex degrees, Trees and distance-basic properties, properties of trees, distance in trees and graphs, disjoint spanning trees, spanning trees and enumeration of trees, Hamilton paths and circuits, Decomposition of graphs, special graphs. Optimization and trees-minimum spanning tree, shortest paths, trees in computer science.

PART- B

Unit 3 - Statistics **12 hrs**

Definition, scope, characteristics, functions and limitations of statistics. Basic concepts-units/individuals, populations/universe, sample, variable, attribute, discrete variable, continuous variable, qualitative data and quantitative data. Stages of Statistical method – collection, organization presentation, analysis and interpretation of data. Classification of data - definition, objectives, types of classification, frequency, class frequency, frequency distribution ,discrete frequency distribution, continuous frequency distribution, inclusive class and exclusive class, class limits, correction factor, open-end frequency distribution, mid-point or class mark, width/size of class, number of classes, cumulative frequency, frequency density, construction of FDT for discrete and continuous data. Tabulation-definition, objectives, types of tables-one way/simple, two way and manifold tables.

Unit 4 : Central Tendency **12 hrs**

Definition, average, arithmetic mean, mode, median, geometric mean and harmonic mean, advantages and limitations. Simple problems on arithmetic mean, geometric mean and harmonic mean. Measures of Dispersion - range, range coefficient, mean deviation, mean deviation coefficient and standard deviation, standard deviation coefficient (definitions only). Problems on mean deviation, mean deviation coefficient and standard deviation, standard deviation coefficient.

Reference s:

1. Introduction to Graph theory by S.Lipschutz
2. Statistics and probability by B.M Aggarwal
3. Statistics by Rajmohan

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit3 and unit4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
3. Each question must contain sub-questions-(a),(b),…
4. The student has to attend any 05 full questions (16*5).
5. The student has to attend at least one question from each unit.

BCA 2.4: C and Linear Data Structures

PART -A

Unit 1- Arrays and Functions **12 hrs**

One and two dimensional arrays, array initialization. Strings - declaration and initialization of string variable, reading and writing strings, string handling functions. Functions – Need, syntax of function declaration, all types of functions, nesting of functions, categories, parameter passing mechanism, function with arrays.

Unit 2- Pointers & Structures **12 hrs**

Pointer arithmetic, dynamic memory allocation, command line arguments. Structure-Definition, declaration, accessing structure members, structure with in structure, example programs, structure with array, union and difference between structure and union with example programs, typedef, enum

PART -B

Unit 3-Stack **12 hrs**

Definition of data structure, types(primitive, non primitive-linear and nonlinear).Linear data structure-Stack: Definition and example, operations, representation of stack in C, evaluation of postfix expression, conversion from infix to postfix using stack table. Recursion: Recursive definition, and process, Recursion in C, writing Recursive programs- factorial. GCD, tower of hanoi, fibanocci, binomial coefficient, efficiency of recursion

Unit 4 –Queue and Linked List **12 hrs**

Queue – Definition, operations, representation of queue in C. Types- circular queue, double ended queue. Linked list - Definition and example, insert and delete (any where), search, count and display, . Circular linked list and doubly linked list (concepts only).

References :

1. Computer Concepts and Programming, *Padma Reddy*
2. Let us C – Yashwanth Kanetkar
3. ANSI C, -*Balagurusamy*
4. Data structures using C and C++ - Yedidyiahetal
5. Programming in ANSI C - E.Balaguruswamy
6. Data structures and programming design using C - Robert Kruse PIII publications
7. Data structures and applications - Trembly and Sorenson
8. Systematic approach to data structure – Padma Reddy

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
3. Each question must contain sub-questions-(a),(b),…
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5. The student has to attend at least one question from each unit.

BCA-2.5 DATABASE MANAGEMENT SYSTEM-I

PART- A

Unit 1-Introduction **12 hrs**

Definitions of Data, database, database system, DBMS, examples, database system applications. Meaning of data and information, database management system vs. file management system, views of data, data independence, data models, database languages, database users and administrators, database system structure, application architecture, advantages of using DBMS, classification of DBMS, meaning of schema and instance.

Unit 2 -E-R Model **12 hrs**

Basic-concepts, Definition of Data Models, Using high-level, conceptual data models for database design, , constraints, keys, an example database application, E-R diagram, types of entities, entity sets, attributes, types of attributes, weak entity sets, cardinality ratios (mapping cardinality), Definition of Ordinality, specialization, generalization. Differences between specialization and generalization.

PART- B

Unit 3 –Relational Model **12 hrs**

Structure of relational Databases, Relational algebra - select, project. union, set difference, rename, division operations, Modification of the database, queries using relational algebra. Extended relational algebra operations.

Unit 4 - SQL **12 hrs**

SQL- Background, basic structure, set operation, aggregate functions, NULL values, nested sub queries, Views, complex queries, Modification of the database, joined relations, Data Definition Language**,** domain constraints, referential integrity in SQL. Assertions, authorization, privileges in SQL.DDL Commands.

References:

1. Korth, Sudarshan "Database System concepts", Mcgraw Hill-IVEdition.
2. Navathe, Silberchatzand Elmasri "fundamentals of database Systems"
3. Addison C.J. Date "Introduction to Database systems" Addison-wesley.
4. Bipin C Desai "Introduction to Data base system" Galgotia publications

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
3. Each question must contain sub-questions-(a),(b),…
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5. The student has to attend at least one question from each unit.

BCA-2.6 DIGITAL FUNDAMENTALS

PART- A

Unit 1- Number System and Boolean Algebra **12 hrs**

Binary number system, decimal number system, octal number system, hexadecimal number system. Bases inter conversions. Representation of negative numbers - 1's and 2's complements. Codes - BCD, GRAY, EXCESS-3. Laws of Boolean algebra, Evaluation of Boolean expression, De Morgan's theorems and proof, simplification of Boolean expressions using Boolean laws, Basic gates (AND, OR, NOT): truth table, Definition, Boolean expression and symbols, universal gates (NAND, NOR) : truth table, definition, Boolean expression and symbols, SOP and POS form, min term and max term, expression of Boolean equation in Min and Max term(conversion of SOP and POS forms to standard form)

Unit 2- Logic Systems and K- Map **12 hrs**

Realization basic gates using NAND and NOR gates. Realization of Boolean expression using basic gates and universal gates. XOR and XNOR gate (working, Boolean expression, symbol and truth table), **K-map method: Rules,** simplification of Boolean equation using K-map (up to 4 variables), without and with don't-care condition, Implementation using basic gates and universal gates, Quine-McCluskey Tabulation method to determine and select essential prime implicantes.

PART- B

Unit 3-Combinational Logic: **12 hrs**

Half adder and full adder, half subtractor and full subtractor. Code converters - BCD to Excess 3 and BCD to gray code, magnitude comparator, encoders (BCD to decimal), decoder (decimal to BCD), multiplexer(4:1 and 8:1), de-multiplexer(1:4 and 1:8).

Unit 4-Sequential Logic: **12 hrs**

Introduction, Flip-flops – SR, JK, D, T, JK-MS (Detailed Study) Registers – Introduction, shift register- types and applications. Counters – synchronous and asynchronous counters (Up, down, up down and Mod counters(asynchronous only)) with timing diagram.

References:

1. Digital Logic and Computer Design- M. Morris Mono
2. Digital fundamentals – B.Basavaraj
3. Digital fundamentals – L Krishnananda

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
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5. The student has to attend at least one question from each unit.

BCA -3.3 Non Linear Data Structures using C++

PART- A

Unit 1 - Introduction to C++ and OOPS **12 hrs**

Object Oriented Programming paradigm, Limitations of structures in C, Basic concepts of Object Oriented Programming- Classes, Objects, Data Abstraction and Encapsulation, Polymorphism, Inheritance, Dynamic binding, Message passing, Benefits of OOP, Object Oriented languages, applications of OOP.C++ features, Comparison with C, Structure of a C++ program, input and output statements Keywords, Data types, symbolic constants, type compatibility, declaration of variables, reference variables, operators in C++, control structures.

Unit 2 - Classes Objects, Member Functions And Constructors- Destructors **12 hr**

Specifying a class, creating objects, memory allocation for objects, static data members, arrays within a class, local classes. Defining member functions, call by reference, return by reference, inline functions, default arguments, making an outside function inline, nesting of member functions, private member functions, function overloading, static member functions, const member functions, pointer to members, friend and virtual functions. Constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, copy constructor, dynamic constructors. Destructors.

PART- B

Unit 3–- Operator overloading And Inheritance **12 hr**

Overloading unary operators, overloading binary operators, overloading operators using friends, string manipulations using operators, rules for operator overloading, type conversions. Inheritance definition, defining derived classes, types-single inheritance, making a private member inheritable, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes.

Unit 4 – Trees And Sorting **12 hrs**

Tree terminologies, Binary tree, binary tree representation, types of binary tree - linked representation, tree traversals, and binary search tree and their applications, algorithm on searching element in a binary search tree, linear search and hashing, Quick sort, insertion sort, shell sort, radix sort, tree sort, heap sorting.

References:

1. E Balguruswamy, Data Structures using C
2. RB Patel, Expert Data Structures with C++, Khanna book publishing
3. YashwanthKanatkar, Data Structures through C

GENERAL INSTRUCTIONS FOR PAPER SETTING

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
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5. The student has to attend at least one question from each unit.

BCA-3.4 DATABASE MANAGEMENT SYSTEM- II

PART -A

Unit 1- Relational Database Design **12 hrs**

Review of relational algebra and relational calculus concepts, Pitfalls in relational data base design, Normalization for relational databases. Normal forms based on primary keys, General definitions of first, second and third normal forms, Functional Dependency (concept and example) decomposition, Boyce-Codd Normal Form - definition and example, fourth Normal form - Multi valued Dependencies - definition and example.

Unit 2 - Storage and File Structure **12 hrs**

Overview of physical storage media, MAGNETIC AND FLASH DISKS – performance measure of a disk optimization of disk block access, RAID, improvement of reliability via redundancy, improvement of performance via parallelism RAID levels, choice of RAID level, File organization – fixed and variable length records, organization of records in files, Data dictionary, Indexing and hashing – basics , Ordered indices, , B+ index files, structure of B+ index tree.

PART- B

1.

Unit 3- Transaction management and Recovery system **12 hrs**

Transaction management- Concepts, simple transaction model, storage structure, transaction atomicity and durability. Recovery system- Failure classification, storage, recovery and atomicity- log records, data modification, concurrency control and recovery, transaction commit (concepts).

Unit 4 - PL/SQL **12 hrs**

Features of PL/SQL, Advantages of PL/SQL, basic syntax, data types and Subtypes. Variables -: declaration, initializing variables, variable scope, assigning SQL query results to PL/SQL variables. Constants And Literals: Declaring a Constant, The PL/SQL Literal, Operators, Precedence, Conditions: IF-THEN and it's flavours, CASE Statement, Searched CASE Statement, Basic Loop Statement, WHILE LOOP Statement, FOR LOOP Statement, Reverse FOR LOOP Statement, Nested Loops, Labeling a PL/SQL Loop, The Loop Control Statements, EXIT Statement, The EXIT WHEN Statement, CONTINUE Statement, GOTO Statement, STRINGS: Declaring String Variables, String Functions and Operators, ARRAYS: Creating a Varray Type.

References:

1. Data base system concepts - Korth , Sudarshan 6th Edition
2. Muruch's Oracle SQL and PL/SQL
3. Oracle Database 11G PL/SQL Programming

GENERAL INSTRUCTIONS FOR PAPER SETTING

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5. The student has to attend at least one question from each unit.

BCA 3.5 SYSTEM SOFTWARE

PART- A

Unit 1 -Machine Architecture **12 hrs**

Introduction, System software and machine architecture, Simplified Instructional Computers (SIC) and its architecture, Instruction Formats of IBM-360. Searching& Sorting - Linear and binary search, comparison, examples. Interchange sort, shell sort, bucket sort, radix exchange sort, address calculation sort, Random entry searching.

Unit 2-Assembler and Loader **12 hrs**

Introduction, General design procedure, design of Assembler, statement of problem, data Structure, Format of Date bases, Algorithm for pass 1 and pass 2, look for modularity. Explanation along with flowcharts for both pass 1 and pass 2 (detailed flowchart). Introduction to loader, Loader schemes-compile and go , general loader, Absolute loader, Sub routine linkage, Relocating loader, Direct linking loader, overlays, Dynamic loading.

PART- B

Unit 3 - Macro Language and macro processor **12 hrs**

Introduction, Macro instructions, Features of macro facility-macro instruction arguments, Conditional macro Expansion, Macro calls within macro, Macro instruction defining macro. Macro processor implementation: statement of problem, specification of databases and specification of database format, Algorithm and flowchart for processing macro definitions and macro expansion.

Unit 4 – Compiler **12 hrs**

Introduction, Statement of problem, Phases of compiler, Detailed study of - Lexical phase, syntax phase, interpretation phase optimization phase, storage assignment phase, code generation phase, Assembly phase, passes of compiler. Data Structures: statement of problem, storage classes and its use.

References:

1. System programming – John. J. Donovan
2. System Software – Leland L. Beck, Third edition, Addison Wesley1997
3. Systems programming and operating systems –Dhamdare

.GENERAL INSTRUCTIONS FOR PAPER SETTING

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BCA - 4.3 JAVA PROGRAMMING

PART- A

Unit 1 - Introduction to Java and Java Program Structure **14 hrs**

History of Java, Java features, Difference between C/C++ and Java, Java program structure, Java tokens, Statements, JVM, Java environment- JDK, JSL. Data types, Constants and Variables, Operators &Expressions, Type conversions, Mathematical functions; Control Statements: Decision making, Branching and looping with while, do-while, for and labeled loops; Arrays- Declaration of 1D, 2D arrays, Class, Objects, Constructor, Method overloading, Static members.
Strings-Introduction, classes and its methods.Vectors.Wrapper classes. Inheritance: Single, Multilevel, Hierarchical, Visibility modes, Method overriding, Final variable, Abstract methods and classes; **Interface**: Defining, Extending and Implementing assigning interface variables

Unit 2 –Packages and multithreading **12 hrs**

Java API Packages, using system packages, naming convention, accessing and using a package, adding a class to packages, hiding classes. Multithreaded programming: Creating a thread, extending the thread class, stopping and blocking a thread, life cycle of a thread, using thread methods, thread exceptions, thread priority, synchronization, implementing the runnable interface.

PART -B

Unit 3- Exceptions and Debugging **12 hrs**

Meaning of errors and exceptions, Dealing with errors, Classifications of exceptions, syntax of handling exceptions, advertising the exceptions, throwing and rethrowing exceptions, creating Exception classes, multiple catch statements, finally clause, tips for using exceptions, Debugging techniques – tricks for debugging, Assertions, Java Debugger (JDB).

Unit 4 – Applets and Graphics **10 hrs**

Applets basics, applet types, applets and application, Life cycle of an applet, applet programming-passing parameter to applets, paint and repaint methods, Graphics class, Line, Rectangle, Circle, Ellipse, Arcs and Polygon. Using control loops in applets, drawing bar charts.

References:

1. Java, The Complete Reference – Patrick Naughton and Schildt
2. Programming in Java – Joseph L Weber
3. Java Programming – E Balaguruswamy
4. Object oriented programming with Java – Mt Somashekara Ds Guru Ks Manjunath

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BCA 4.4 PL/SQL DATA WAREHOUSING

PART- A

12.

Unit 1-Procedures, Functions and Triggers 12 hrs

15.

Parts of a PL/SQL Subprogram, Creating a Procedure, Executing a Standalone Procedure, Deleting a Standalone Procedure, Parameter Modes in PL/SQL Subprograms, Methods for Passing Parameters. Functions: Creating a Function, Calling a Function, Cursors : Implicit Cursors, Explicit Cursors, Declaring the Cursor, Opening the Cursor, Fetching the cursor, Closing the, Cursor, Exceptions: Syntax for Exception Handling, Raising Exceptions, User-defined Exceptions, Pre-defined Exceptions, Triggers: Creating Triggers, Triggering a Trigger

Unit 2– Packages, Collections and Transactions 12 hrs

PL/SQL — PACKAGES: Package Specification, Package Body, Using the Package Elements, COLLECTIONS: Index-By Table, Nested Tables, Collection Methods, Collection Exceptions

TRANSACTIONS: Starting and Ending a Transaction, Committing a Transaction, Rolling Back Transactions, Automatic Transaction Control. OBJECT-ORIENTED: Instantiating an Object, Member Methods, Using Map method, Using Order method, Inheritance for PL/SQL Objects, Abstract Objects in PL/SQL

PART -B

Unit 3 - Data Warehousing and OLAP 12 hrs

Data Warehouse basic concepts: ODS, ETL functions, ODS and DW architecture, Guidelines for implementing DW, Difference between ODS and DW, OLTP and DW, OLTP and OLAP, Data Warehouse Modeling, Data warehouse Schema. OLAP: Characteristics, Multi-dimensional view and data cube, Data cube operations

Unit 4 - Data Mining 12 hrs

Introduction to Data Mining: KDD process, Architecture of Data Mining, Motivating Challenges, Data Mining Tasks, Data Mining Technologies Data Pre processing: Cleaning, integration, transformation, data reduction, data normalization. Data Mining Applications. Classification and Clusters- concepts and examples, Decision tree- concepts, algorithm, creating decision tree using information gain.

References:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining Addison- Wesley,2005.
2. G.K.Gupta : Introduction to Data Mining with Case Studies, 3rd Edition, PHI, NewDelhi,2009
3. Arun K Pujari: Data Mining Techniques University Press,2nd Edition, 2009.
4. Jiawei Han and Micheline Kamber : Data Mining-Concepts and Techniques, II Edition, Morgan KaufmannPublisher,2006.
5. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining and OLAP Computing, Mc GrawHill Publisher,1997.

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BCA -4.5 SOFTWARE ENGINEERING

PART- A

Unit 1–Introduction **10 hrs**

Definition of software, software problems (industrial strength software, software is expensive, late and unreliable maintenance and rework), software engineering challengers (scale, quality and productivity, attributes), software engineering approach (phased development process, managing process, components.

Unit 2 –Software processes and Software Planning **14 hrs.**

Introduction to software process (processes and process modules, component of software process), characteristics of software process(predictability, support, testability and maintainability, support change, early defect removal, process improvement and feedback), and software process models (waterfall, prototype, iterative enhancement model, spiral) comparison of processmodels. Introduction to planning, effort estimation (uncertainties, building efforts, bottom-up, COCOMO model), project scheduling and staffing (overall, detailed scheduling, team structure), risk management (concepts, assessment), project monitoring plan (measurements, project monitoring and tracking).

PART- B

Unit 3 – Analysis and Design **12 hrs**

Software requirements (needs and requirement process), problem analysis (informal approach, data flow modeling, object oriented modeling, prototyping), requirement specification (characteristics of SRS, components of SRS, specification language, structure of requirement document), validation. Design: Function oriented design: design principles, module level concept (coupling, cohesion), structure design methodology (DFD, first level factoring).

Unit 4 –Coding and Testing **12 hrs**

Coding: programming principles and guidelines (common coding errors, structured programming, information hiding, some programming practices, coding standards), refactoring (basic concepts with examples, common refactoring), verification (code inspections, static analysis, proving correctness, unit testing). Testing: testing fundamentals, black box and white box testing, comparison between black box and white box testing, regression testing, testing process- levels of testing, test plan.

References:

1. An integrated approach to software engineering-Pankaj Jalote.
2. Roger Pressman, Software Engineering- A Practitioner's Approach TMH
3. Ian Sommerville, Software Engineering, Pearson Publications Ltd.

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BCA - 5.1 ADVANCED PROGRAMMING IN JAVA

PART- A

Unit 1 - AWT, Advanced Graphics Programming 12 hrs

Review of Java Concepts .AWT and AWT Classes, Window fundamentals – Component, Container, Panel, Window, Frame, Canvas. Working with frame window. Graphics Programming: Graphics class, methods, working with colors and fonts. Advanced graphics operations using Java2D. Designing simple User Interfaces (UIs) using AWT (Label, Text Field, Choice, List, Checkbox, Checkbox Group, Scrollbar, Button, Text Area, Panel), Layout Manager.

Unit 2 –Event Handling and Swings: 12 hrs

Event Handling: Basics of Event Handling, the delegation event model, AWT event hierarchy and event classes, Event Listener Interfaces, Adapter Classes, anonymous inner class, Event queue. Swing: Meaning, need difference between AWT and swing. The Model-View-Controller (MVC) design patterns, Creating simple UIs using swing (JLabel, JText Field, JCombobox, JList, JCheckbox, JScrollbar, JButton, JRadioButton, JScroll Pane, J Panel, J Tabel, J Tree, JFrame) and handling basic events.

PART- B

Unit 3 - File Management and JDBC 12 hrs

File, creating a file, writing to a file, opening a file, reading from a file, file management, checking existence of a file, deleting a file. JDBC: Meaning, need, concept and structure of JDBC, relation with ODBC, JDBC driver types and their meaning, the JDBC process – loading the driver, connecting to the DBMS, creating and executing SQL statement, Connection object, Statement object, Prepared Statement object, Callable Statement, Result Set, JDBCExceptions.

Unit 4 -Fundamental concepts of Collections, Generics and Java Beans 12 hrs

Collections: Meaning, need, Collection interfaces, Concrete Collections – Array List, Hash set, Map . Generics**:** Meaning, need, benefits, generics usage, basics of generic types, type parameter naming conventions, type wildcards, using type wildcards, generic methods, bound types, writing simple generic container, implementing container, implementing constructors, implementing generic methods. Meaning and need of Java Beans, Advantages, Bean writing process, Bean properties. Java Archives (JARs): Meaning, need, the JAR utility, Creating JARfiles.

References:

1. The Complete Reference – Java 2: Herbert Schildt, 5th Edition, Tata McGraw-Hill
2. Thinking in Java: Bruce Eckel
3. Core Java 2: Volume I – Fundamentals: Cay S. Horstmann, Gary Cornell, Pearson Education Asia.
4. Core Java 2: Volume II – Advanced Features: Cay S. Horstmann, Gary Cornell, Pearson Education Asia.

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BCA5.2 WEB PROGRAMMING

PART -A

Unit 1–Introduction **12 hrs**

Internet, WWW, Web Browsers and Web Servers, URLs, HTTP, Evolution of the Web, Peak into the History of the Web, Internet Applications, Important Components of the Web, Web Search Engines, Application Servers.HTML and DHTML Concepts : Programming structure, different basic tags , Images, Hyper text Links. Lists, Tables, Forms, Frames. Cascading Style Sheets**:** Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags.

Unit 2 –The JavaScript **12 hrs**

Overview of JavaScript, Execution Environment, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Arrays, Functions, Pattern matching using regular expressions, Examples. Events and Event Handling, Meaning of client and server, Client-Server architecture, benefits, concept of ports and sockets. Protocol – Meaning, definition, examples, meaning of stateless and state (state full) protocols. HTTP protocol – meaning, http protocol request and response header formats, status codes. Client-Server communication scenario.

PART -B

Unit 3 – JEE Technology Concepts **12 hrs**

Multi-tier architecture for application development – Meaning, need, advantages. Meaning of enterprise application and web application, various tiers in enterprise application – client tier, web tier, business tier, enterprise information system tier. Introduction to JEE concepts – Need, advantages, characteristics of JEE technology, the concepts of containers, components and services – meaning of web container, application client container, EJB container.

Unit 4 – Basics of PHP and Java Server Pages Programming Concepts **12 hrs**

Introduction to JSP - language structure, advantages, characteristics, comparison between Java and Java Server Pages. Various aspects of Java Server Pages programs, writing and executing JSP programs. Writing dynamic programs using JSP. Database programming through JSP. Basics of PHP : Introduction ,variables ,functions, sessions, date, my sql integrations with php, file uploading.

References:

1. The Complete Reference – J2EE – Jim Keogh
2. J2EE – Kevin Mukhar, James L. Weaver, James P Crume, RonPhillips
3. learningphp and mysql4thEdition Robin Nixon.
4. Begining php-5 and Mysql Cristian Darie.

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BCA 5.3 OPERATING SYSTEM

PART- A

Unit 1–Introduction **12 hrs**

Definition of Operating System, need. Early systems – Batch Systems, Multiprogramming, Time Sharing, Parallel and Distributed systems. Special Purpose Systems – Real Time, Embedded Systems, Multimedia Systems, Handheld Systems. Computing Environments – Traditional, Client Server, Peer-to-Peer and Web based. Open Source Operating Systems.

Unit 2 –Process Management **14 hrs**

Process concept – meaning of process, sequential and concurrent processes, process state, process control block, threads, Process scheduling – scheduling queues, schedulers, context switch. Operations on Processes – creation and termination. Inter process communication – Independent and co-operating processes. Communication in client-server systems – RPC and RMI. Process scheduling – Basic concepts Processor - CPU I/O burst cycle, CPU Scheduler, Preemptive scheduling, dispatcher. Scheduling criteria, Scheduling algorithm – First-Come-First-Served (FCFS), Shortest Job First (SJF), Priority Scheduling, Round Robin. Multi-level queue scheduling (Concepts only), multi- level feedback queue scheduling (Concepts only). Multiple processor scheduling, real time scheduling.

PART -B

Unit 3–Deadlocks **08 hrs**

Definition with example, System model, Dead lock characterization – Necessary Conditions, Resource Allocation Graph, Dead lock prevention, Avoidance and detection, Recovery from deadlock.

Unit 4 –Memory Management, Disk and File Management **14 hrs**

Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Virtual memory - demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing. Secondary Storage Structure and Disk Management: Disk structure & scheduling methods, Disk management, disk reliability. File concepts, Access methods, Directory structure, Protection and consistency semantics, File system structure, Allocation methods, free space management.

References:

1. Abraham Silberschatz and Peter Baer Galvin, Operating System Concepts, Fifth edition, Addison - wesley 1989.
2. Milan Milonkovic, Operating System Concepts & Design, II Edition, McGRaw Hill 1992.
3. Stallings, Operating Systems, PearsonEdition.
4. Tanenbaum, Operating System Concepts, PearsonEducation
5. Nutt : Operating System, 3/e Pearson Education2004

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BCA5.4 DATACOMMUNICATION

PART- A

Unit 1 - Introduction to Data Communication 14 hrs

Communication model & Data Communication networking –types. Data Transmission- Transmission terminology, Analog & Digital data transmission, Transmission impairments – attenuation, delay distortion & noise. Guided Transmission- types- Twisted pair, coaxial cable & optical fiber – physical description, application & characteristics. Unguided Transmission- wireless transmission: types- Terrestrial type, Satellite, Broadcast radio – physical description, application & characteristics.

Unit 2-Dataencoding 10 hrs

Basics, types and description of different signals, Digital data & digital signals: NRZ, multilevel binary, Bi phase techniques. Digital data & Analog signals: Encoding techniques- ASK, FSK, PSK Analog data & Digital signals: PCM & delta modulation Analog data & Analog signals: Modulation- AM & FM Spread spectrum: Frequency hoping, direct sequence Asynchronous & synchronous transmission: Line configurations- full duplex & half duplex.

PART- B

Unit 3- Data link control & medium access sub 12 hrs

Flow control: Stop and wait & sliding window flow control. Error detection: Parity check, CRC Error control: Stop and wait ARQ, Go Back-N ARQ High-level data link control: basics, Characteristics, frame structure, operation Medium access sub layer- the channel allocation problem. Multiple access Protocol- ALOHA, carriers sense multiple access protocol, collision free protocol.

Unit 4- Multiplexing and Switching 12 hrs

Frequency division multiplexing- characteristics, analog carrier systems, Time division multiplexing- characteristics, link control. Digital carrier system, ISDN user network interface. Circuit switching networks- switching concept, space division & time division switching- Pocket switching networks-principles, switching technique, and packet size. Comparison of Circuit switching & Pocket switching

References:

2. Data and Computer Communications – William Stallings.
3. Computer Networks – Andrew S.Tanen baum.
4. Data Communication – Ulysis D Black.
5. Data Communication and Networking – Behrouz A. Forouzan.
6. Internetworking with TCP/ IP – Douglas E comer, PHI

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BCA 5.5 COMPUTER NETWORKS

PART -A

Unit 1-Basics **14 hrs**

Uses of computer networks, network hardware- broadcast networks, point – to -point networks, network software-protocol hierarchies, design issues, interface & services, connection oriented & connection less services, service primitives, OSI reference model- description of each layer. TCP/IP reference model, comparison of the two models, Critique of the OSI model and protocols, Critique of the TCP/IP model and protocols, Example networks-ARPANET,ATM.

Unit 2- The Network layer **12 hrs**

Design issues, routing algorithms- the optimality principle, shortest path routing, distance vector routing, and link state routing. Congestion control algorithms- general principle, Congestion prevention policies, traffic shaping. The network layer in the internet - the IP protocol, IP address, and subnet. Internet control protocol.

PART -B

Unit 3- The Transport layer **12hrs**

The transport service- services provided to the upper layer, quality service, and transport service primitives. Elements of transport protocol - addressing, establishing a connection, releasing a connection. A simple transport protocol- the example service primitives, the example transport entity. The Internet transport protocol (TCP & UDP)- the service model, the TCP segment header, the TCP connection management. UDP - header.

Unit 4- The Application layer **10hrs**

Network security - traditional cryptography, two fundamental cryptographic principles, secret key & public key algorithms.DNS - Name space, SNMP - model.Electronic mail, architecture and services, www.

References:

1. Data and Computer Communications – WilliamStallings.
2. Computer Networks – Andrew S.Tanenbaum.
3. Data Communication – Ulysis DBlack.
4. Data Communication and Networking – BehrouzA.Forouzan.
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BCA - 6.1 UNIX OPERATINGSYSTEM

PART- A

Unit 1-Introduction **12 hrs**

The Unix operating system, , A brief Session, The Unix Architecture, Features of UNIX, POSIX and Single UNIX specification, Locating commands, Internal and External commands, Command Structure, Flexibility of command Usage, Man Browsing the Manual Pages ON-line, Understanding the man Documentation. General-Purpose Utilities: Cal command, date command, echo, printf, bc, script, passed, who, uname.

Unit 2 – The File System **10 hrs**

The file, The Parent –Child Relationship, The HOME Variable, pwd, cd, mkdir, rmdir, Absolute Pathname, Relative Pathname, ls, The Unix File system. Handling Ordinary Files: Cat, cp, rm, mv, more, The lp subsystem: Printing a File, File, wc, od, cmp, comm, diff, dos2unix and unix2dos, compressing and archiving files, gzip, and gunzip, tar, zip and unzip. Basic File Attributes: Listing file attributes, listing directory attributes, File Ownership, File Permissions, changing file permissions, Directory Permissions, Changing File Ownership.

PART- B

Unit 3 – The Vi Editor **14 hrs**

Vi basics, Input Mode, Saving Text and Quitting, Navigation, Editing Text, Undoing Last EditingInstructions(UandU),Repeatingthelastcommand(.),SearchingforaPattern(/and ?), Substitution. Process basics, process status, system process, Mechanism of process creations, Internal and external commands, process states and zombies, running jobs in background, nice, killing process with signals, job control, at and batch, cron, timing process. Simple Filters: The sample database, pr, head, tail,cut, paste, sort, uniq, tr, displaying a word- count list. Filters using regular expressions: grep, basic regular expressions, extended regular expressions.

Unit 4 –The Shell **12 hrs**

The shell's Interpretive Cycle, Shell Offering, Pattern Matching, Escaping and Quoting, Redirection, /dev/null and /dev/tty, Pipes, tee, Command Substitution, Shell variables. Essential shell programming: Shell scripts, read, using command line arguments, exit and exit status of command, the logical operators &&and ||- conditional execution, the if conditional, using test and to evaluate expressions, the case conditional, expr, $0: calling a script by different names, while, for, set and shift, the here document (<<), trap, debugging shell scripts with set –x, sample validation and data entryscripts.

References :

1. Sumitabha Das, UNIX System V.4, Concepts and Applications, TMH

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BCA - 6.2 .NET PROGRAMMING

PART -A

Unit 1 - Introduction to C# & .NET platform and Building C# Applications 10 hrs

Introduction to C# and .NET platform : .NET solution, Building blocks of the .NET platform(CLR, CTS, CLS), Role of .NET base class libraries, .NET Aware programming languages, role of common intermediate languages & type metadata and assembly manifests, A tour of the .NET namespaces. Building C# Applications : Role of the command line complier(csc.exe), Building a C# application using csc.exe, the command line debugger(cordbg.exe), using the visual studio.NET IDE & its debugging, C# pre-processor directives.

Unit 2 - C# language fundamentals 14 hrs

Anatomy of a basic C# class, creating objects: constructor basics, Default assignments & variables scope, variables initialization syntax, basic inputs & output with the console class, understand static methods, arrays & string manipulations, Encapsulation Services, Class Properties , Read and Write only Properties, Static Properties, Inheritance Is As keyword Usage, Controlling Base Class Creation With Base, Sealed Classes, Delegation , Polymorphism, The Virtual and Override Keywords ,Abstract Classes, Abstract Methods

PART- B

Unit 3 - Exception & object life time and Interface and Collections 12 hrs

Exception & object life time :The Basics of Object Life Time, The Role Of Application Roots, Understanding Object Generations, The Role Of .NET Exception Handling, Throwing a Generic Exception ,Catching Exceptions, Properties of Exception, Multiple Exception (Concepts Only),The Finally Block. Interface & Collections : Definition, Implementing an Interface in C#, Interface members at object level, Interface as Parameters, Interface as Return Values, Arrays of Interface Types, Interface Hierarchies, Interface as polymorphic agents, Exploring the system. Collections Namespaces.

Unit 4 – Introducing windows forms 12 hrs

Overview of the system. windows. Forms Namespaces, An Anatomy of a Form, A Simple Form Program, Function with Control Class, The Functionality Of the Form Class, Component class, control class, Programming with windows forms controls : Working with Button types, Check Boxes, Radio Buttons, Group Boxes, List Boxes, Calender control, assigning tool tips for controls.
The Two Faces Of ADO. NET, Understanding ADO.NET Data Providers, Understanding The Connected Layer of ADO.NET, Working with Connection Object, Inserting, Updating and Deleting Records

References:

1 Pro C# with .NET 3.0 Andrew Troelsen
2 2 C# Programming E Balaguruswamy

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BCA - 6.3.1 ELECTIVE-I DIGITAL IMAGE PROCESSING

PART- A

Unit 1- Digital Image **12 hrs**

Introduction: Motivation and Perspective, Scenes and Images, Application: Components of Image Processing System. Visual Preliminaries: Brightness Adaptation and Contrast- Acuity and Contour, Texture and Pattern Discrimination, Shape Detection and Recognition- Perception of Color. Image Formation: Geometric Model, Basic Transformations, Perspective Projection, Camera Calibration- Photometric Model. Digitization:Sampling, Quantization, Visual Detail inthe Digital Image, Digital Image, Elements of Digital Geometry.

UNIT-2: Image Processing **12 hrs**

ImageEnhancement: Contrast Intensification, Smoothing, Image Averaging, Mean Filter, Ordered Statistic Filter, Edge Preserving Smoothing Low Pass Filtering. Image Sharpening, High, PassFiltering, Homomorphic Filtering. Restoration: Minimum Mean, Square Error Restoration, Least Square Error Restoration ,Constrained, LeastSquare Error Restoration, Restoration by Singular Value Decomposition-Restoration by Maximum A Posterior Estimation, Restoration by Homomorphic Filtering.

PART- B

UNIT-3 :Image Compression **12 hrs**

Error Criterion: Lossy Compression methods, loss –less compression, Huffman coding, Run length coding- Block coding, Quad Tree coding- contour coding. Registration: Geometric Transformation, Plane toPlane Transformation, Mapping Problem in Discrete Domain –Stereo Imaging Algorithms.

Multi-Valued Image Processing: Processing of color Images, Processing of Satellite Image, and Medical Image Processing. Segmentation: Region Extraction-Pixel based Approach, Feature Thresholding, Optimum Threshold, Threshold Selection Methods, Multi-level Thresholding, Local Thresholding, Region based Approached.

UNIT-4: Image Analysis and Feature Extraction **12 hrs**

Edge and Line Detection: Edge Detection, Derivation operators, Pattern Filling Approach, Morphologic Edge Detection, Edge Linking and Edge Following, Edge elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection. Representation: Topological Attributes, Geometrical Attributes, Some other Properties, Description, - Boundary based Description-Region based Description-Relationship. Recognition: Deterministic Methods, Clustering, Statistical Classification,Fuzzy Mathematical Recognition,Syntactic Recognition, Grammar, Recognition Strategy, Tree search, Graph Matching.

References:

1) B. Chand and D. DuttaMajumder ,Digital Image Processing and analysis, PHI(2001)
2) Milan Sonka, "Image Processing Analysis and Machine Vision", PWS Pub.2nd Ed.
3) Adrian Low, Computer vision and Image Processing, McGraw Hill (1991)
4) Kenneth R. Castle man, Digital Image Processing ,PHI

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BCA - 6.3.2 ELECTIVE-I CLOUD COMPUTING

PART- A

Unit1 - Cloud Computing Basics **12 hrs**

Cloud Computing Overview- Applications – Intranets and the cloud – Why Cloud Computing Matters – Benefits – Limitations – Companies in the Cloud Today – Cloud Services.

Unit 2 - Cloud Computing Technology **12 hrs**

Hardware and Infrastructure – Clients – Security- Network – Services – Accessing the Cloud - platforms – Web Applications – Web APIs –Web Browsers –Cloud Storage – Overview – Cloud Storage Providers –Standards –Application – Client – Infrastructure – Service.

PART -B

Unit 3 - Cloud Computing At Work **12 hrs**

Software as a service – Overview – Driving Forces – Company offerings – Industries– Software plus Services – Overview - Mobile Device Integration –Providers – Microsoft Online.

Unit 4 - Developing Applications **12 hrs**

Google – Microsoft – Intuit Quick Base – Cast Iron Cloud – Bungee Connect - Local clouds and Thin Clients – Virtualization – Server Solutions – Thin Clients. Cloud Services for Individuals – Cloud services aimed at the mid-market –Enterprise-Class Cloud Offerings – Migration.

References:

1. Velte T. Antony, Velte J. Toby. andElsen Peter Robert (2010), "Cloud Computing: A Practical Approach", Tata McGraw- Hill
2. Miller Michael (2008), "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing.
3. Beard Haley (2008), "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", EmereoPvt. Limited.

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BCA- 6.4.1 ELECTIVE-II COMPUTERGRAPHICS

PART -A

Unit 1 - IntroductiontoMultimedia **12 hrs**

Definition, CD-ROM and the multimedia highway, Uses of Multimedia, Introduction to making multimedia – The stages of Project, the hardware & software requirements to make good multimedia, Multimedia skills .Multimedia building blocks- SOUND: MIDI, Digital audio, audio file formats. Images: still images, color and file formats. ANIMATION: principles of animation, making animation. VIDEO: using video, how video works, and videostandards.

Unit 2 - Introduction toGraphics applications **12 hrs**

CAD , presentation graphics, computer art, entertainment, education and training, visualization, image processing. Display devices – raster scan displays – color CRT, DVST, LCD, 3D viewing devices. Raster scan systems, Random scan systems.

PART-B

Unit 3 -Outputprimitives **12 hrs**

Points and lines, line drawing algorithm, DDA algorithm, Bresenham's line algorithm, examples, parallel line algorithm, loading the frame buffer, circle generating algorithm, midpoint circle algorithm, and ellipse generating algorithm. Pixel addressing and object geometry. Color and gray scale levels, color tables, character attributes. Basic Transformations- translation,scaling, rotation, matrix representation and homogeneous coordinates, composite transformations, general pivot point and fixed point rotation, scaling directions, other transformations – reflection, shear, transformation between coordinates, inverse transformations.

Unit 4- WindowingandClipping **12 hrs**

Introduction, the viewing transformation, viewing transformation implementation, clipping, Cohen-Sutherland outcode algorithm, Liang-Barsky line clipping algorithm, Sutherland- Hodgeman polygon algorithmand adding clipping to the system, text clipping, exterior clipping, curve clipping.

References:

1. Tay Vaughan "Multimedia – making it work", TMH publication, fifthedition.
2. D Hearn & M P Baker: "Computer Graphics C version", PearsonEducation
3. D Newman and Sproull: "Principles of Interactive Computer Graphics -, TMH,IIedition.
4. Steven Harrington "Computer graphics: A programming Approach", TMH publication. Secondedition
5. Roy plastock and Zhigang Xiang: " Computer graphics". Schaum's outline series, II edition.

GENERAL INSTRUCTIONS FOR PAPER SETTING

In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
3. Each question must contain sub-questions-(a),(b),…
4. The student has to attend any 05 full questions (16*5).
5. The student has to attend at least one question from each unit.

BCA - 6.4.2 ELECTIVE-II OPERATIONS RESEARCH

PART-A

Unit1-Operations Research & Linear Programming 14 hrs

Operations research: Nature and meaning, models characteristics, advantages, scope. Linear Programming Problems: Formulation (both minimization and maximization type) solution of LPP using graphical method. General LPP. Basic solutions and degenerate solutions.Standard form and canonical form. Characteristic features of LPP. Simplex method for solving LPP.

Unit 2 - Transportation Problem 12 Hrs

Big-M method and 2 phase method for solving LPP. Transportation Problem - Formulation, Necessary and sufficient condition for the existence of feasible solution to a Transportation problem. Initial Basic Feasible Solution by North West Corner Rule, Least Cost Method and Vogel's Approximation Method. Optimal solution using U-V method.

PART-B

Unit 3 – Assignment Problem and Game Theory 14 Hrs

Assignment Problem.:Formulation, optimal solution using Hungarian algorithm, traveling salesman problem. Game Theory:Basic definitions, minmax - maxmin principle and optimal strategy solution of games with saddle point, dominance rule for solving a two-person Game, Graphical method for solving two-person game.

Unit 4 -Network analysis 10 Hrs

Basic differences between PERT and CPM, PERT, CPM, Network components and precedence relations, rules of network construction, errors and dummies in network, critical path analysis, project time cost trade-off, resource allocation.

References:

1. S. D. Sharma – Operations research
2. Hamdy A. Taha, " Operation Research – An introduction" 5th edition, PHI.,
3. KantiSwarup, P. K. Gupta &Manmohan – "Operation Research", 1996.
4. S. Kalavathy: "Operations Research", Second Edition – Vikas Publications

GENERAL INSTRUCTIONS FOR PAPER SETTING

In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.

1. In each paper unit-1 and unit-2 are Part-A and unit-3 and unit-4 are Part-B.
2. There shall be 08 questions (4 questions from each part).
3. Each question must contain sub-questions-(a),(b),…
4. The student has to attend any 05 full questions (16*5).
5. The student has to attend at least one question from each unit.

I -SEMESTER

Excel & C Lab

PART- A

1. Write DOS commands for the following:
   a. To create a file
   b. To view a created file
   c. To edit the contents of file
   d. To rename an existing file
   e. To delete an existing file
2. Write DOS commands for the following:
   a. To make a directory
   b. To rename a directory
   c. To delete a directory
   d. To change the directory
   e. To display date, time and version

PART -B

Table A

Sales Person	Gender	Number of Sales	Sales Amount	Sold Month and Year
Cara	F	10	8000	12013
Jessy	F	7	6000	12013
Lewis	M	5	4000	32013
Tommy	M	3	2000	42013
Annie	F	2	2000	12013
Jack	M	3	2000	52013
Hugo	M	1	400	52013
Jonathan	M	1	400	72013
Aaaron	M	1	400	12014
Willy	M	4	2800	82013
Patrick	M	3	900	12013
Simmons	M	5	1750	12014
Pattrick	M	6	2250	82013
Taylor	M	2	800	42013
Boon	M	3	1275	42014
Walsh	M	1	450	72013
Julie	F	5	2375	22013

Use only Formula's to Derive the results

Questions	Answers
Sum of sales amount	
Average of sales amount	
Minimum Sales amount	
Maximum number of sales	
Count of Sales Person	
Count of Male Sales person	
Sum of Sales amount of Female Person	
Average of sales amount of Female Person	
Average of Sales amount made in January 2013	
Median of Total Sales amount	
First Quartile to Sales Amount	
Third Quartile to Sales Amount	

Populate the number of sales for below listed Sales Person (Use formula)

Sales Person	Number of Sales
Aaaron	
Pattrick	

1. Consider the above excel sheet and derive the answers using formulae
2. Demonstration of sorting, filters and advanced filters
3. Usage of pivot table.

PART -C

1. Program to find the biggest and the smallest among 4 numbers using nested if.
2. Program to find the roots of quadratic equation.
3. Program to check whether the given number is Armstrong number, odd or even, perfect square or cube.
4. Program to check whether nth prime is palindrome.
5. Program to find the factors of nth Fibonacci number.
6. Program to convert decimal to binary.
7. Program to generate n terms of the series 1,-2,6,-24,120…….
8. Program to find e^x using n terms of the series $1+ x + x^2/2! + x^3/3! +$…..
9. Program to count the number of vowels, consonants and special characters in a string by reading the string character by character.
10. Generate n prime numbers and print them in the following pattern

```
          2                                   2
        3   5        OR                   3   5   7
      7  11  13                        11  13  17  19  23
   17 19  23  29 …                   29  31  37  41  43  47  53…..
```

PRACTICAL EXAM SCHEME

Practical Proper: 60 Marks
Record : 10 Marks
Viva : 10 Marks

DOS (any 5 commands) (10 marks)	**Writing of DOS Commands**	**5 Marks**
	Error free execution of DOS Commands	**5 Marks**
MS Excel (10 marks)	**Any five functions from questions 1 2 and 3 Proper syntax and result (2 marks each)**	**10 marks**
C- Program (40 marks)	**Flowchart/Algorithm**	**5 Marks**
	Program writing	**20 Marks**
	Correct program and Error free compilation	**10 Marks**
	Correct output	**5 Marks**

II -SEMESTER

DATA STRUCTURES & Advanced Excel Lab

PART -A

1. All types of data validation
2. Data visualisation using charts
3. Data visualization using scatter charts, spark lines and gauge charts
4. Usage of hyper links.

PART -B

1. Program to insert an element at given position in an array.
2. Program to multiply two matrices using functions.
3. Program to swap two integers using function with call by value and call by reference mechanism.
4. Program to create a dynamic array of n elements and find their sum and print in reverse order using functions with pointers(sum(int *,int)and rev_print(int *,int))
5. Program to store information of n students (name, regno, dob, m1,m2,m3,tot, avg and result) in an array of structures and find total, average and result using function.
6. Program to find a^b using union to store the values of a, b and a^b (for both int and/or float values of a and b)

PART- C

1. Program to implement the operations of stack using array.
2. Program to implement the operations of circular queue.
3. Program to convert infix expression to prefix notation.
4. Program to evaluate postfix expression.
5. Program to implement any three recursive functions.
6. Program to implement queue using linked list.
7. Program to evaluate an expression using linked list

PRACTICAL EXAM SCHEME

Practical Proper: 60 Marks
Record : 10 Marks
Viva : 10 Marks

MS Excel (10 Marks)	Any one problem from the list	10 Marks
C- Program (25 marks)	Flowchart/Algorithm	5 Marks
	Program writing	10 Marks
	Correct program and Error free compilation	5 Marks
	Correct output	5 Marks
Linear Data Structure (25 marks)	Algorithm	5 Marks
	Program writing	10 Marks
	Correct program and Error free compilation	5 Marks
	Correct output	5 Marks

III- -SEMESTER DS Lab Using C++

PART- A

1. Consider a class student with data members name, regno, course, m1, m2, m3 and member functions getdata(), showdata(), result() to read, print and tabulate result. Write C++ program to store the details of n students and display their result in tabulated form.
2. Write a C++ program to define a class BankAccount including the following class members and store information of n customers and display their details. DataMembers:, cust name, accno, balance.
   Member Functions: a) getdata(custname,accno,balance). b) display(). c).Transaction(tr_type,amt) if Tr_type='D' transaction is deposit else transaction is withdrawal. This function should update the balance according to tr_type after checking the minimum balance of Rs 1000.
3. Write C++ program to demonstrate operator overloading
4. Program to demonstrate the use of simple, parameterised and copy constructors
5. Program to demonstrate inline and friend function.
6. Program to demonstrate function overloading.
7. Program to demonstrate multiple or multilevel inheritance

PART- B

1. Program to demonstrate the operations of doubly linked list
2. Program to demonstrate tree traversal
3. Program to implement tree sort.
4. Program to implement quick sort
5. Program to implement heap sort.
6. Program to implement radix sort.
7. Program to demonstrate time and space complexity in binary and linear searching
8. Program to compare shell and insertion sort methods.

PRACTICAL EXAM SCHEME

Practical Proper: 60 Marks
Record : 10 Marks
Viva : 10 Marks

C++- Program (25 marks)	Program writing	15 Marks
	Correct program and Error free compilation	5 Marks
	Correct output	5 Marks
Linear Data Structure (35 marks)	Flowchart/Algorithm	10 Marks
	Program writing	15 Marks
	Correct program and Error free compilation	5 Marks
	Correct output	5 Marks

III-SEMESTER
SQL LAB

I. Create emp and dept tables as below and write SQL statements for the following queries

Emp(ename not null, eno primary key, doj date,dob ,mgrno self reference key, salary >0 , comm, deptno foreign key)

Dept(dname not null, dno primary key, location)

1. Find the employee details in ascending order of their name and descending order of their salary
2. Find the details of all employees in the research department
3. Find the minimum, maximum and average salary of each department
4. Find department name having least number of employees
5. Find the department name having highest annual payroll
6. Add an employee under the manager smith
7. Find the employees who are not getting commission
8. Display the eno, name manager name and department name in the order of their department

II. Create tables as below Student(name string, regno string primary key, dob date, doj date ,course string foreign key) Markscard(regno foreign key, sem string, sub1 number, sub2 number, sub3 number, tot number, avge number, result string)

Calculate total, average and result using update statement

Write SQL statements for the following queries.

1. List the names of students studying in BCA course in the order of their joining
2. Find the name of student who has scored highest marks in every sem of each course
3. Count the number of students in each course (consider only distinct students of the course)
4. Find the course having second highest number of students
5. Raise the marks of sub3 in III sem BCA students by 5% if the student has failed in that subject
6. Display the details of student 'xxx' in every semester.

III. Dept(deptno integer pkey, dname string not null, loc string not null)

Emp(eno integer pkey, ename string, deptno fkey, desgn string not null, bsal number>0) Salary(eno fkey,da,hra,gross,it,pf,net,comm) DESGN ARE manager,clerk,salesman. Comm=5% of basic if desgn=salesman otherwise null. Da=15% bsal hra = 7% of bsal gross=bsal+da+hra.

IT =0 if gross<15000

= 10% of gross if gross between 15000 and 30000

=20% of gross if gross between 30000 and 50000

= 30% of gross otherwise

PF =10% of gross or 1000 whichever is less. Calculate salary using update statement

Write sql statements for

1. Count the number of employees in every designation
2. List the employees of every department in descending order of their net salary
3. List the name and salary of highest salary payer in every department
4. List the name of employee paying highest IT in each department
5. List the departments in every location
6. Raise the basic salary by 10% for the managers of every department.

IV. Create tables as below

Employee(eno primary key, ename, street, city)
Company(cno primary key, cname, city)
Works(eno foreign key, cno foreign key, sal>0)
Manages(mno foreign key from employee table , eno foreign key from employee table)

Write sql statements for the following queries

1. Find the name of all employee working in the city in which they live
2. Find the company having most employee
3. Count the number of employees under each manager.
4. Find the company having second highest payroll
5. Find employee drawing more salary than his manager in every company
6. Raise the salary of every manager by 25%
7. Find name of employees who are not having managers
8. Find average, highest and lowest salary of every company
9. Delete the employees and the information of company 'xxx'

PRACTICAL EXAM SCHEME

Practical Proper: 60 Marks
Record : 10 Marks
Viva : 10 Marks

Table creation	10 Marks
Inserting proper data	08 Marks
Table updation (if necesssary)	12 Marks
5 / 7 writing	15 / 21 Marks
Execution	15 / 21 Marks

IV -SEMESTER
PLSQL BASIC PROGRAMS

PART - A

1. Create a library table with attributes book id, author_name, publisher, price and edition. Write PL/SQL code block to accept the publisher name and count number of books under that publisher and display it. Also display the publisher with maximum publication.
2. Write a function to display employee name with distinct salaries

   For eg

   if a 's salary is 100
   b 's salary is 200
   c 's salary is 100
   display either (a or c) and b
3. Write a function to rank the employees based on their salary (use RANK function)
4. Write a function to validate the Employee email id.
5. Write a procedure to capture the error log in a table in case of an exception using Autonomous_transaction,
6. From employee table, store ename and salary in varrays and display the contents of the arrays in table format.
7. Write an Anonymous block which raise a user defined exception on thursday?
8. Write an anonymous block using associative array that is indexed by a string, populates it, and prints it.

PART -B

1. Write a pl/sql code block to create a table and menu driven code to add, modify and drop specified column in it.
2. Write a pl/sql code block to create a database and menu driven code to add, rename and drop specified table into it.
3. Write a PL/SQL cursor program which is used to calculate total salary from emp table without using sum() function?
4. Create a trigger to record the changes like insert, update, delete over the employee table (The changes should be recorded in new audit table Employee_au)
5. Write a function to remove the duplicates in the employee table and copy all the records into another new table.
6. Write a function using bulk collect , to process set of 100 records in one iteration
7. Write a statement trigger on emp table such that the insertion is possible only on Thursday.
8. Write a function using dynamic sql statements , where the column names and the table name should be provided as input to the function.
9. Write an anonymous block to create nested tables and compare the values in nested tables
10. Write an anonymous block using multilevel VARRAY
11. Write an anonymous block to check if a collection element exists or not ?
12. Write a function using NEXT and PRIOR to access the elements in a collection TABLE

PRACTICAL EXAM SCHEME

Practical Proper: 60 Marks
Record : 10 Marks
Viva : 10 Marks

Part A (20 marks)	Program writing	10 Marks
	Error free compilation	05 Marks
	Correct output	05 Marks
Part B (40 marks)	Program writing	20 Marks
	Error free compilation	10 Marks
	Correct output	10 Marks

IV -SEMESTER
Java Lab

PART- A

1. Write a Java program to display only those multi-digit prime numbers between a given range whose digit sum is prime. Display the prime number and its digit sum side by side. Read the value for the range using *readLine()* method of *BufferedReader* class.

   Sample output:
   If range is; m = 20, n=50

Prime number		Sum of digits
23	-	5
29	-	11
41	-	5
43	-	7
47	-	11

2. Write a Java program to sort the elements of a square matrix. Read the order and elements of the matrix during execution. Before sorting the elements of the matrix, display the source matrix.

   Sample output:
   Input Matrix is:

   ```
   20  2  35
   4  16  7
   41  3  2
   ```

   Matrix elements after sorting:

   ```
   2    2    3
   4    7    16
   20   35   41
   ```

3. Write a java code to create a class with data members name, category, doj, and fees and static members total_fee, categorywise_no_students, methods to Insert data using parameterized constructor, display student information along with total fees and number of students in each category.
4. Write java program to demonstrate method overloading to generate random numbers, random alphabet sequence and random strings.
5. Assume that an examination authority conducts qualifying examination for candidates twice each year. First, in the month of June, second, in the month of December. Before the exam, it opens a registration process so that candidates register themselves. After the end of the registration dates, the authority consolidates the list of candidates and generates the unique register numbers. These numbers are assigned to each candidate. The format of the register numbers is as below. Each register number should contain exactly 10 characters.

	year of Registration	cle	·ial Number

For example, if year of registration 2018, cycle 2 and there are five candidates registered then, registration numbers are: QE2018<u>2001</u>, QE2018<u>2002</u>, QE2018<u>2003</u>, QE2018<u>2004</u>, QE2018<u>2005</u>.

The serial numbers should contain exactly 3 digits. To maintain it, prefix zeros as needed. (up to 9 serial number should be prefixed with two zeros, after 9, upto 99 it should be prefixed with single zero and after 99, no zeros). Write a Java program to generate the registration numbers as per the above requirement.

6. Write a Java program to read name, register number, date of birth, address, phone number a student. Concatenate these to frame a single content by delimiting each detail with a special symbol, pass it to a method which should separate and display the details of the student. Declare a class containing the following methods:

   void getInformation() – to read student information. It should call concatenate(,,,,) by passing relevant information.

   void concatenate(String name, string regNo, String dob, String address, String phoneNo) to join the information to frame a single content. It should call

extractInformation(…) by passing the concatenated information.

void extractInformation(String joinedInfo)

to extracted concatenated contents and to display the information.

Declare another class to contain main () method which calls *void getInformation().*

Sample output:

Student Name: Venkata Krishna

Register Number: BC171128

Date of Birth: 10/05/1996

Address: No. 5, First Cross, Nehru Nagar, Sagar.

Phone Number: 9900990099

Concatenated content:

Venkata Krishna%BC171128%10/05/1996%No. 5, First Cross, Nehru Nagar, Sagar.%9900990099

(Application: This is the way using which collection of information is communicated between client and server in networked environment)

7. Consider class person with fields name, address and date of birth and methods read_data() and show() and another class employee inherited form person class with fields emp_id, date of join and salary and methods read() and show(). Write java program to implement the concept of single inheritance with method overriding concepts for the above classes.

PART B

1. Write a Java program to create a vector, add elements at the end, at specified location onto the vector and display the elements. Write an option driven program using switch…case and also insertion of any type of objects must be possible. Read input as strings and find the type of data and convert them into appropriate objects of appropriate classes. (Ex: 10 must be converted to object of Integer class, 2.5 into object of Float class etc.). Handle exception while converting the inputs.
2. Declare an interface containing methods *float addition(float x, float y)* and *float subtraction(float x, float y)*. Declare the classes implementing the interface to perform respective operations as listed below.

Bank - to carryout deposit and withdrawal operations. In addition to the implementation for the abstract methods, the class should contain additional methods to read and display customer information to perform the respective transaction.

EmployeeSalary - to calculate the gross and net salary. In addition to the implementation for the abstract methods, the class should contain additional methods to read and display employee information, allowance amount and deduction amount to perform the respective transaction.

Main class - which instantiates above two classes and calls respective methods.

3. Write java program to demonstrate multi level inheritance using appropriate real life example.
4. Write a java program to create a package Number which contains a class with three static methods prime, fibanocii and Armstrong that checks whether the passed value is belongs to the corresponding types.
5. Write a java program to demonstrate multithreading using runnable interface.
6. Write an applet to display the address of a person (atleast 4 lines) using parameter passing concept. Appropriate message should be displayed for wrong input.
7. Write an applet to draw a polygon based the number of sides of the polygon as input. Ex. If sides =3 it should draw a triangle, for 4 square for 8 octagon etc.
8. Write an applet to draw n squares, rectangle and circles.

PRACTICAL EXAM SCHEME

Practical Proper: 60 Marks
Record : 10 Marks
Viva : 10 Marks

Part-A (25 marks)	**Program writing**	**15 Marks**
	Correct program and Error free compilation	**5 Marks**
	Correct output	**5 Marks**
Part-B (35 marks)	**Program writing**	**20 Marks**
	Correct program and Error free compilation	**10 Marks**
	Correct output	**5 Marks**

KUVEMPU UNIVERSITY

Revised syllabus

BCA, B. Sc (Computer Science) and BA (Computer Applications)

W.E.F 2019-20

DEPARTMENT OF P.G. STUDIES AND RESEARCH IN COMPUTER SCIENCE,

JANNASHAYADRI , SHAKARGHATTA

SHIMOGA, KARNATAKA

NEW SYLLABUS FOR B.A (Computer Applications)

(EFFECT FROM 2019-20)

Paper code	Semester	Subject	Weekly hours	Internal marks	External marks	Practicals	Total
BAC-1	I	Computer Fundamentals	4+3	10	50	40	100
BAC-2	II	C-programming	4+3	10	50	40	100
BAC-3	III	Introduction to Data Structure	4+3	10	50	40	100
BAC-4	IV	OOPS with C++	4+3	10	50	40	100
BAC-5.1	V	JAVA	4+3	10	50	40	100
BAC-5.2	VI	DBMS	4+3	10	50	40	100
BAC-6.1	VII	Internet Programming	4+3	10	50	40	100
BAC-6.2	VIII	SE&CN	4+3	10	50	40	100

FIRST SEMESTER BA (Computer Applications)

Computer Applications -I

BAC-1 Computers Fundamentals

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction: **10 hrs**

Definition of computer, Characteristics of computer, history of computers,generations of computer,functional units of a computer, types of computers-based on principle of working, based on size & speed, Definitions of digital computer&analog computer, Definition of super computer,example for super computer.

Unit 2- Hardware: **10 hrs**

Input Device- Keyboard & mouse, OCR, OMR. Output device- monitor and brief description of CRT monitor, Printer and brief description of dot matrix printer, Projector and Headphone (Definition and Uses). Memory-Primary memory: RAM, types of RAM, ROM and its types, Difference between RAM &ROM,Secondary memory: Brief description of working of hard disk and floppy disk,Types of CD-ROM.

Unit 3-Software : **10 hrs**

Definition of software, types of software's – application, system and utility software, Definitions of assembler, compiler, interpreter, linker, loader. Types of Programming Languages -assembly language and machine level language (advantage and disadvantages). Definition of operating System, functions of an operating system, types of operating system, MS DOS Commands with syntax and example (copycon, type, copy, rename, del, make directory, remove directory, dir and its types, copy files from one drive to other drive, tree, hiding files)

Unit 4-Problem solving techniques: **09 hrs**

Algorithm-definition, Characteristics, Notations, Advantages and Disadvantages.Flowchart-Definition, Symbols, Advantages and Disadvantages. Writing an algorithm and flowchart: Area of circle, Arithmetical operations, simple interest and compound interest, Swapping of two numbers, largest of two numbers, factorial of a number, reverse a number, Fibonacci series.

Unit 5-Logic gates: **09 hrs**

Binary number system- Conversion of decimal number into binary number and Conversion from Binary to Decimal number system. ASCII code(brief), Gates – AND, OR, NOT, NAND, NOR, XOR (Definition, Truth Table & Logic Symbol), De-Morgan's Theorem (Statement and Proof).Boolean Laws.

References:

1. Computer fundamentals- P B KOTTUR
2. Computer fundamentals- RAJARAMANNA
3. Digital Logic and Computer Design- M. Morris Mono

QUESTION PAPER PATTERN FOR I SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL :COMPUTER BASICS LAB

1.DOS COMMANDS: DATE , TIME, CLS, COPY CON, TYPE, DIR with wild cards, MD, CD, RD, COPY, XCOPY, FORMAT, DISKCOPY etc,.

2.**MS-WORD:**Drafting, Entering, Working with all Menus, Using different fonts and colours the following:

1. Bio-Data
2. Application for Job
3. Joining Report
4. Creation of Marks Card

3.**MS-EXCEL:**Drafting, Entering, Working with all Menus, Using different fonts and colours the following:

1. Bio-data
2. Creation of marks card
3. Result calculation

4.POWERPOINT: Formatting, updating and printing of the following:

1. Text matter with different fonts
2. Preparing Charts : Pie Chart
3. Preparing Graphs: Bar Graph
4. Introducing Animation
5. Introducing Sound Effect
6. Using Hyperlinks

PRACTICAL EXAM SCHEME

- Practical Proper - 30 marks
- ✓ **DOS COMMANDS**–Any two 2X 5marks=10 m
- ✓ arks (writing-2 marks and execution-3marks)
- ✓ **MS-WORD/MS-EXCEL/POWERPOINT**-20marks(writing-10marks and execution-10 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

SECOND SEMESTER BA (Computer Applications)

Computer Applications -II

BAC-2 C- Programming

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1-Introduction to C: **10 hrs**

History of C, features of C, basic structure of C, character set, tokens- keywords, identifiers, constants, variables, strings, definition, types, rules for naming, syntax for the declaration, symbolic constant definition.

Unit 2- Operators: **10 hrs**

Increment and Decrement operators, Arithmetic, relational, logical, assignment and bitwise operators, conditional operator and special operators of C, data type conversion, precedence and associativity of operators. Mathematical functions. Formatted and unformatted Input and Output functions – gets(), puts(), getchar(), putchar(), printf() and scanf().

Unit 3-BranchingControl Structures: **09 hrs**

Conditional Control Structures: If Statement, if-else statement, nested if, Switch statement (Explanation with syntax, flowchart and example), goto statement (syntax and example, use).

Unit 4- Looping Control Structures: **09 hrs**

while, do-while and for statements (Explanation with syntax, flowchart and example),Nested for statement. Unconditional control statements - break continue, return and exit(syntax and example).

Unit 5-Arrays and Functions: **10 hrs**

Definition of array, Declaration and initialization, One and two dimensional arrays, string definition, Declaration and Initialization of String variable, String handling functions. Definition of Function, syntax for function declaration and function definition, types of functions, Recursion –definition and example.

References:

1. Computer Concepts and C Programming by P B Kottur.
2. Ansi C, by Balagurusamy E

QUESTION PAPER PATTERN FOR II SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL : C PROGRAMMING

1. Conversion of temperature given in Degree Fahrenheit to temperature in degree Celsius using the formula C = (F-32)/1.8 and vice-versa.
2. Find the biggest amongtwo numbers.
3. Find whether the entered number is odd or even.
4. Arithmetic operations using switch statement.
5. Check whether an entered number is Prime number or not.
6. Find the Fibonacci series between M and N.
7. Searching an element in an array.
8. Addition of two matrices
9. Find the factorial of a number using function.
10. Perform swapping of two numbers using functions

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Flowchart/Algorithm 05 Marks
- ✓ Program Writing 15 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

THIRD SEMESTER BA (Computer Applications)

Computer Applications -III

BAC-3 INTRODUCTION TO DATA STRUCUTRES

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction : **10 hrs**

Definition of Structure, syntax and example for structure declaration.Definition of union, syntax and example for union declaration, difference between structure and union.Pointers–Definition, Declaration, Examples. Dynamic memory allocation functions – syntax and examples. Definition of Data Structure and types of data structures with examples.

Unit 2- Stack and recursion: **10 hrs**

Definition and example of stack (LIFO), operations of stack with algorithms, applications of stack, algorithm for the conversion of infix to postfix expression.Tower of Hanoi problem and Factorial of a number using recursion.

Unit 3- Queue : **10 hrs**

Definition and example of Queue (FIFO), operations on queue, types of queue – ordinary queue and circular queue (definitions only), disadvantages of ordinary queue.Linked list–Definitions and types of lists – Single Linked List, Doubly Linked List (definitions only).

Unit 4-Tree : **09 hrs**

Definition of a Tree, Definition of root, left sub tree, right sub tree, degree of node, terminal node, depth,Definition of Binary tree, types of binary tress (definition only), Algorithm for tree traversal.

Unit 5-Sorting and searching : **09 hrs**

Definition of sorting, explanation of bubble sort, radix sort and merge sort with examples. Definition of searching, explanation of Binary search andLinear search with examples.

References:

1. Systematic approach to data structure –A M Padmareddy
2. Programming in ANSI C - E Balaguruswamy
3. Datastructures and applications - Trembly and Sorenson

QUESTION PAPER PATTERN FOR III SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL :DATA STRUCUTRES LAB USING C

1. Employee program using structure.
2. Implementation of stack
3. Recursive program to simulate Tower of Hanoi concept
4. Recursive program to find factorial of a number
5. Implementation of queue
6. Implementation of linked list
7. Binary tree traversals
8. Bubble sort
9. Binary search
10. Linear Search

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Flowchart/Algorithm 05 Marks
- ✓ Program Writing 15 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

FOURTH SEMESTER B.A (Computer Applications)

Computer Applications -IV

BAC-4 OBJECT ORIENTED PROGRAMMING WITH C++

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to OOP: **10 hrs**

Object Oriented Programming paradigm, Basic concepts of Object Oriented Programming- Classes, Objects, Data Abstraction and Encapsulation, Polymorphism, Inheritance, Dynamic Binding, Message passing, Benefits of OOP, Object Oriented languages, applications of OOP.

Unit 2-Introduction to C++: **10 hrs**

Difference between C and C++, Structure of a C++ program, input and output statements, tokens - Keywords, identifiers, constants, strings and operators, reference variables – definition and example, special operators in C++, brief introduction to control structures in C++.

Unit 3-Classes Objects and Member Functions: **10 hrs**

Difference between structure and class, syntax and example for class declaration, Definition of data member and member function, Defining member function inside and outside the class, inline functions, memory allocation for objects, static data members and static member functions, function overloading, definition of friend function, syntax and example for the declaration of friend function, special characteristics of friend function.

Unit 4-Constructors, destructorsand Operator overloading: **09 hrs**

Definition of a constructor, types - parameterized constructor, default constructor, copy constructor, special characteristics of constructor, definition of a destructor, special characteristics of destructor, definition to Operator overloading, overloading binary operator (+) to add two complex numbers, rules for operator overloading.

Unit 5: Inheritance and templates: **09 hrs**

Inheritance definition, forms of inheritance, syntax and example for defining derived classes, visibility modes, explanation of multilevel inheritance and hybrid inheritance with examples. Definition of templates, syntax and example for class and function template.

Reference Books:

1. Object Oriented Programming with C++ - E Balaguruswamy
2. C++ - The Complete Language – BjarneSchildt
3. Object Oriented Programming in Turbo C++ - Robert Lafore

QUESTION PAPER PATTERN FOR IV SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL :C++ LAB

Write a C++ Program:

1. Which reads a radius of a circle and computes the area of the circle.
2. Which takes an 'n' digits integer number as input and computes the sum of the digits and prints it.
3. To check whether the number is palindrome or not.
4. To find the result of a student using class concept.
5. To Define a class employee having data members name, basic salary, net salary with the member function getdata(), showdata(). Calculate the net salary assuming appropriate % for all allowance and deductions using class concept.
6. To concatenate two strings using library functions.
7. To print Fibonacci series using constructor.
8. To find biggest of two numbers using function overloading.
9. To calculate area of triangle, rectangle and circle using function overloading.
10. To implement Multilevel inheritance by creating classes: Grand Father, Father and Son

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Flowchart/Algorithm 05 Marks
- ✓ Program Writing 15 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

FIFTH SEMESTER B.A (Computer Applications)

Computer Applications -V

BAC-5.1 DATABASE MANAGEMENT SYSTEM

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction DBMS: **10 hrs**

Meaning of data and information, definitions of database, applications of database system, definition of DBMS, disadvantages of file processing system (advantages of DBMS), three levels of data abstraction, difference between schema and instance, definition of data models, types of data models (brief explanation), database languages – DDL and DML.

Unit 2- E-R model : **10 hrs**

Different types of database users, functions of Database Administrator (DBA), basic-concepts - Primary keys, foreign key, super key, definition of E-R diagram, symbols used in E-R Diagram, E-R diagram for Banking enterprise, E-R diagram for Book store, types of entities, entity sets, attributes, types of attributes, weak entity sets, cardinality ratios (mapping cardinality).

Unit 3- Relational model: **10 hrs**

Fundamental operations of Relational algebra - select, project, union, set difference, join, division operations (explanation with examples). Types of aggregate functions – MAX, MIN, SUM, COUNT and AVERAGE (Definition with example).

Unit 4-SQL: **09 hrs**

Definition of Query, explanation of basic structure of SQL – Select, from and where clauses in SQL, data types in SQL, explanation of set operation in SQL – Union, intersection, except, NULL values.

Unit 5- Database: **09 hrs**

design Pitfalls in relational database design, definition of Normalization, Various types of Normal forms (Definitions only) – First Normal form, Second Normal form, Third Normal form, Boyce-Codd Normal Form (BCNF).

Reference Books:

1. Korth, Sudarshan "Database System concepts", Mcgraw Hill-IV Edition.
2. Navathe, Silberchatz and Elmasri "fundamentals of database Systems"-Addison Wesley-2004
3. C.J. Date "Introduction to Database systems" Addison-wesley. 4. Bipin C Desai "Introduction to Data base system" Galgotia publications

QUESTION PAPER PATTERN FOR V SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL :SQL LAB

I. Design an ER-Diagram for representing the BANK scenario.

II. Design an ER-Diagram for representing the College Library Scenario.

III. Use the default EMP and DEPTtables to write SQL statements for the followingqueries

1. Find the employee details in ascending order of their name and descending order of their salary
2. Find names of all employees whose name starts with ‘s’.
3. Find names of all employees who have atleast 6 characters in their name.
4. Find the details of all employees in the research department
5. Find the minimum, maximum and average salary of each department

IV. Create table with the following fields:

TEACHER (teacher-Id, Name, Subject(sub1,sub2,sub3))

Write SQL queries to perform the following:

1. List all the teachers whose teacher-Id lies between 10-20.
2. List all the teachers whose name starts with letter ‘a’.
3. Listall the teachers who are teaching ‘sub2’.
4. List the teacher whose teacher-Id is 12 and teaching ‘sub2’.

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Writing ER-Diagram-10 Marks
- ✓ Table creation & data insertion -10 marks
- ✓ SQL queries- 2 X 5 marks =10 marks[Queries writing 3 marks (each) and Execution 2 marks (each)]
- Viva – voce - 05 Marks
- Record - 05 Marks

FIFTH SEMESTER BA (Computer Applications)

Computer Applications -VI

BAC-5.2 JAVA PROGRAMMING

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction: **10 hrs**

History of Java, Java features, Difference between C/C++ and Java, Java and Internet, Java and WWW, Web browsers, Java support system, Java Development Kit (JDK), Application Programming Interface(API), Java Runtime Environment (JRE).

Unit 2-Overview: **10 hrs**

Structure of Java program, Java tokens, java character set, Java Statements, Implementing Java program, Java Virtual Machine, difference between Applets and applications,

Unit 3- Control Statements and operators in Java: **10 hrs**

Constants, Variables and Data Types in Java, Type casting, Arithmetic operators, relational operators, logical and assignment, conditional, bitwise and special operators, Control Statements: Branching Decision making – if, if-else, nested if, else-if ladder & switch and Looping statements with while, do-while, for statements.

Unit 4- Method overloading: **09 hrs**

Definition of a Class, syntax and example for the declaration and for defining the class, Objects, class members, Constructor, Method overloading, Inheritance: forms of inheritance, Method overriding, Visibility Controls.

Unit 5-Packages : **09 hrs**

Array – 1D array, declaration, creation and initialization of 1D array, Strings – String methods, Vector – Vector methods, , Defining, Extending and Implementing Interfaces, Definition of a Packages, Java API Packages, Creation, accessing and usage of packages.

Reference Books:

1. Programming with Java- A primer, 4th Edition, by E balaguruswamy.
2. The Complete Reference – Patrick Naughton and Schildt
3. Programming in Java – Joseph L Weber

QUESTION PAPER PATTERN FOR I SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL – JAVA PROGRAMMING LAB

1.Write a Java program to convert the given temperature in Fahrenheit to Celsius and display the values in tabular form.
2.Write a Java program to generate first n odd numbers.
3. Write a java program to find area of circle and rectangle using method overloading.
4.Write a Java program to find the circumference of the circle using interface.
5.Write a java program to sort the alphabets in the given string.
6.Write a Java program to create a vector, add elements at the end, at specified location onto the vector and display the elements. Write an option driven program using switch…case.
7.Write a java program to accept student information using array of objects and constructor initialization.
8.Write a java program to perform matrix addition and multiplication using case statement
9.Write a java program to implement constructor overloading by passing different number of parameter of different types.
10.Write a java program to accept studentinformation to perform relevantcomputation using single inheritance.

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Writing 20 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

SIXTH SEMESTER BA (Computer Applications)

Computer Applications -VII

BAC-6.1 INTERNET PROGRAMMING

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction: **10 hrs**

Internet basics, basic concepts, communicating on the internet, internet domain, internet server identities, establishing connectivity on internet, client IP address, Overview of TCP/IP and its services, TCP protocols – WWW,FTP, TELNET.

Unit 2-Introduction to HTML: **10hrs**

Information files creation, Web server, web client/browser, HTML tags, structure of HTML program, Text formatting, Text styles, text effects.

Unit 3-Lists: **10hrs**

Definition, types - Unordered and ordered list, adding graphics to HTML Documents. Tables – Definition, table tags and attributes. Definition of Link and its attributes, external and internal document references.Images as Hyperlinks.

Unit 4- Frames: **09 hrs**

Definition, tags, examples. Cascading Style Sheets (CSS) and its Attributes – font, color and background, text, border, list. Span and Divtags.External Style sheets.

Unit 5: Introduction to Javascript: **09 hrs**

Web pafes, Forms, Form validation, Netscape and javascript, Client side javascript, Advantages of javascript, writing javascript into HTML, Basic programming Techniques - Data types and literals, Creating Variables.

References:

1. Web enabled Commercial Application Development using HTML, JAVASCRIPT, DHTML and PHP, by IVAN BAYROSS, 4th Edition, BPB Publication.

QUESTION PAPER PATTERN FOR VI SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL – INTERNET PROGRAMMING LAB

1. Working with web browsers
2. Understanding the working of a web server
3. Home Page Design – Bio Data
4. Home Page Design – College
5. Home Page Design – With Audio Integrated
6. Home Page Design – With Video Integrated
7. Home Page Design – With Audio and Video Integrated
8. Home Page Design – With Animation

PRACTICAL EXAM SCHEME

- Practical Proper - 30 Marks
- ✓ Program Writing 20 Marks
- ✓ Correct output with proper display 10 Marks
  (Partial output – 05 marks)
- Viva – voce - 05 Marks
- Record - 05 Marks

SIXTH SEMESTER B.A (Computer Applications)

Computer Applications -VIII

BAC-6.2 SOFTWARE ENGINEERING & COMPUTER NETWORKS

Theory Examination- 50 Max marks. **Number of Teaching hours –48**

Internal Assessment- 10 Max marks

Unit 1- Introduction to Software Engineering: **10 hrs**

IEEE definition of Software and Software Engineering, Software Problems, Software engineering challenges, Software quality attributes, phases in software development (Phased Development process), Definition of Software process, Component software process,desired characteristics of software process, Software development process models- waterfall model.

Unit 2- Software design: **09 hrs**

Definition of SRS, need for SRS, Characteristics of SRS, Structure of SRS, design principles, module level concepts – coupling and cohesion.

Unit 3- Coding and testing : **09 hrs**

Definition of Coding, Programming principles and guidelines, definition of testing, testing fundamentals, levels of testing, Difference between black box testing and white box testing.

Unit 4-Introduction to Computer networksand Network Hardware: **10 hrs**

Definition of computer network, Goals of computer network, Types of Networks based on transmission technology - Broadcast, point- to -point, Types of Networks based on size & scale - LAN, WAN, MAN, Protocol hierarchies (Network software), Network topologies – Bus, Mesh, Ring, tree and star.

Unit 5- Network Software, Reference models and Transmission Media: **10 hrs**

Reference models - OSI / ISO model, TCP / IP model, Transmission Media - twisted pair, coaxial cable, fiber optics cable, Internet and its applications, Wireless media - Bluetooth, Wi-Fi.

References:

1. An integrated approach to Software Engineering:PankajJalote.
2. Software Engineering a practitioners approach : Roger Pressman.
3. Computer Networks:5th Edition, Andrew S Tanenbau

QUESTION PAPER PATTERN FOR VI SEMESTER B.A (Computer Applications)

PART -I: 05 Marks

There shall be 05 questions each carrying 01 Marks from all units

PART -II: 10 Marks

There shall be 05 questions each carrying 02 Marks from all units

PART- III: 15 Marks

There shall be 05 questions from 05 units, each question carrying 05 Marks, The student has to attend only 03 questions out of 05 questions.

PART- IV: 20 Marks

There shall be 03 questions and each carrying 10 Marks.
The student has to attend only 02 questions.
(Each question should have at least two sub questions)
Question 1 from Unit 1
Question 2 from Unit 2 & Unit 3.
Question 3 from Unit 4 & Unit 5.

PRACTICAL: PROJECT LAB

PROJECT LAB EXAM SCHEME

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories. The project is of 3 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The Project work should be either an individual (one) or a group of not more than five members.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and process logic
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future application

The examiner will evaluate the project work as follows:

- Project Report - 10 Marks
- Project Demo - 10 Marks
- Viva-Voce - 20 Marks

KUVEMPU UNIVERSITY

PHYSICS

THREE YEAR B.Sc., DEGREE COURSE

(Semester Scheme)

TO BE IMPLEMENTED FROM THE YEAR - 2019

Scheme of theory syllabus and Examination

1. *Theory 4 hour lectures per week and each practical is 3 hours*
2. *Theory and practical examination duration is 3 hours*

zSEMESTER	THEORY			INTERNAL ASSESSMENT (I.A)	PRACTICAL	TOTAL MARKS
	PAPER	PAPER CODE	MAX. MARKS	MAX. MARKS	MAX. MARKS	
I	I	SSA710-A	50	10	40	100
II	II	SSB710-A	50	10	40	100
III	III	SSC710-A	50	10	40	100
IV	IV	SSD710-A	50	10	40	100
V	V	SSE610-A	50	10	40	200
	VI	SSE611-A	50	10	40	
VI	VII	SSF610-A	50	10	40	200
	VIII	SSF611-A	50	10	40	

Question paper Pattern
PAPER: I to VIII semesters (all papers)

Section A

- To be answered in brief.
- Short answer questions.
- Questions are to be set on the concept of the subject.
- Small relevant problems may be included.
- Each question carries 2 Marks.
- 7 questions are to be answered out of 9 questions given.

Section B:

- Long answer type questions –To be answered with detailed explanation, analysis, mathematical derivation etc.,
- Each question carries 4 Marks.
- 6 questions are to be answered out of 8 questions given.

Section C:

- Problems.
- Each problem carries 3 marks – includes both numerical and theoretical problems.
- 4 questions are to be answered out of 6 questions given.

Practical Examination:

Submission of duly certified record book in the examination is compulsory. The candidate who has not submitted the record book is not eligible to take the practical examination.

Maximum Marks for doing Examination	:	30
Maximum Marks for Practical Record Book	:	05
Maximum Marks for Viva-Voce	:	05
Grand total	:	40

FIRST SEMESTER (PAPER-I)

MECHANICS AND PROPERTIES OF MATTER

(4 hours of lecture per week) **60 Hours**

1. *PLANAR MOTION*:

Review of vector algebra, Scalar and Vector product. Derivative of a vector. Review of polar coordinates. Derivative of a vector of constant magnitude (derivation of $\frac{d\vec{A}}{dt} \perp \vec{A}$).Radial and transverse components of velocity and acceleration (meaning and derivation of R and T components) – application to uniform circular motion- centripetal force, areal velocity(derivation), problems. 5 Hrs

2. *FRAMES OF REFERENCE*:

Concept of frames of reference. Galilean transformations, Galilean principle of relativity (statement and explanation using various examples).

Inertial frames: Newton's laws of motion (statements and their significance). A frame of reference moving with a uniform velocity with respect to an inertial frame is also inertial (Proof).

Non-inertial frames – A frame of reference moving with uniform Acceleration with respect to an inertial frame – a non-inertial frame (proof). Fictitious force – examples. Measurement of acceleration using plumb line (derivation).

Rotating frames of reference - derivation for expression of force. Types of forces in rotating frame. Discussion of the earth as an inertial frame, Foucault pendulum (brief explanation).Conical pendulum – expression for Time period (derivation)w.r.t an inertial (lab) and non inertial (rotating frames).Problems. 11Hrs.

3. *SYSTEM OF PARTICLES*: Newton's laws for a system of particles (qualitative)–centre of mass (definition)– External and internal forces. Linear momentum of system of particles, motion of CM, Law of conservation of linear momentum -Rocket motion – expression for instantaneous and final velocities – effect of earth's gravity – multi stage rockets – brief account of Indian rockets.

Angular momentum – Relation between the torque and momentum, theorems on total angular momentum about CM. Law of conservation of angular momentum - examples.

Work done by a variable force: Work – energy theorem(derivation) – conservative force fields, potential energy - conservation of energy, examples – oscillation of a loaded spiral spring Atwood machine (calculation of acceleration using conservation of energy).

Collisions: Elastic and inelastic collisions – elastic head on collision – oblique collision of identical masses in a plane.

Central forces – characteristics of central motion. problems. 13Hrs

4. *GRAVITATION:*

Newton's law of gravity in vector form. Gravitational potential and field for spherical mass distributions –thin spherical shell and solid sphere (derivation in both case).*Kepler's laws* – statements and derivation, conditions for different orbits, brief account on physics of tides.

Elements of satellite motion – orbital velocity, time period andescape velocity (Brief explanation). geosynchronous orbits, applications of artificial satellites, GPS (in brief).problems. 8Hrs.

5. *ROTATIONAL MOTION*:

Concept of a rigid body. Moment of inertia-definition and its significance. Equation of motion for rotation motion- K.E of a rotating body (derivation), General Theorems on moment of inertia. (1) perpendicular axes theorem- for plane lamina and for three dimensional body (2) parallel axes theorem (Statement and proof for both).Mention of expression of M I for rectangular plate and circular disc about different axes. Expression for MI of solid cylinder and solid sphere about different axes (derivation).motion of a cylinder rolling down in an inclined plane – expression for velocity and energy(derivation). Theory of compound pendulum –time period, problems. 7 Hrs

6. *ELASTISITY*:

Stress and strain – elastic limits – Hooke's law – molecular origin –Elastic constants for an isotropic solid, Poisson's ratio- limiting value of Poisson's ratio (for both theoretical and practical), the inter-relation between elastic constants $\mathrm{k} = \frac{\mathrm{q}}{3(1-2\sigma)}$, $\mathrm{n} = \frac{\mathrm{q}}{2(1+\sigma)}$, & $\mathrm{q} = \frac{9\mathrm{nk}}{3(\mathrm{k}+\mathrm{n})}$. Work done in stretching and work done in twisting a wire - Torsion of a cylinder –

couple per unit twist derivation, torsional pendulum- frequency expression (derivation). Theory of Bending moment and Single cantilever, I Section girders -problems. 8 Hrs

7. VISCOSITY:

Streamline and turbulent motion, coefficient of viscosity, critical velocity, Reynold's number, Poiseuille's equation (derivation), Stokes law (derivation from dimensional formula), terminal velocity, factors affecting viscosity of a liquid (qualitative), Applications.Problems. 4 Hrs

8. *SURFACE TENSION:*

Synclastic and anticlastic surface –Illustration of surface tension with examples, relation between surface tension and surface energy, molecular theory of surface tension. *Excess pressure within a curved surface* (derivation) - application to spherical and cylindrical drops and bubbles. Factors affecting surface tension of a liquid. Applications. Problems.
4Hrs

NOTE : Sufficient numbers of problems are to be worked out in each section which would enhance the understanding of the subject.

REFERENCES:

1)Berkeley course in physics – vol I
2) Classical mechanics – Takwale.
3) Classical mechanics – K.N.SrinivasRao.
4) Fundamentals of physics – Halliday, Resnick and Walker- sixth edition.
5) Mechanics – D.S.Mathur.
6) Properties of matter – D.S.Mathur.
7) Newtonian mechanics – A.P. French.
8) Physics- vol-1 : Clark

PRACTICALS –I

(One experiment per week to be conducted in 3 hours duration)

1) Bar pendulum – g and k by h-T and h^2- hT^2 graph.
2) Spiral spring – force constant, g and unknown mass by graphical method.
3) Fly wheel – M.I, mass and density of fly wheel.
4) 'q' by Stretching – graphical method.
5) 'q' by uniform bending – graphical method.
6) Surface tension by capillary rise method.
7) Surface tension and angle of contact by Quinke's method.
8) Surface tension and interfacial tension by drop weight method.
9) Viscosity of water by capillary flow method.
10) Viscosity of oil by Stoke's method.
11) Specific heat by cooling – graphical method.
12) Perpendicular axis theorem using torsion pendulum.
13) Bulk modulus of rubber.
14) Conservation of energy- using inclined plane.
15) Determination of elastic modulii, Poisson's ratio and acceleration due to gravity 'g'.
16) To study kinematics of Atwood's machine and hence to determine the value of 'g'

NOTE:

1. Suitable and relevant experiments may be included.
2. Experiments mentioned in I and II semester may be redistributed depending upon the facilities available in the laboratory.
3. Minimum of 8 experiments should be done in each practical.
4. Experiment should be elaborative so as to extend for 3 hours duration.
5. Error estimation may be included for few experiments.

SECOND SEMESTER (PAPER- II)

HEAT & THERMODYNAMICS, RADIATION, WAVES, OSCILLATIONS & SOUND.

(4 hours of lecture per week) 60 Hours

1.*THERMODYNAMICS*:

Concept of heat and temperature, Zeroth law and first law of thermodynamics .Brief discussion of isothermal and adiabatic processes, Equation of state of a gas in adiabatic processes (derivation). Relation between P,V and T. Slopes of Isothermal and adiabatics. Relation between Isothermal and adiabatic elasticities.P-V diagram. Carnot cycle: Expression for efficiency (no derivation).

Second law of thermodynamics: Kelvin and Clausius statements. Applications of Second law of Thermodynamics-Refrigerator. Carnot theorem-Statement and proof. Thermo-dynamic scale of temperature. Clausius-Clayperon equation (derivation)- It's application for Melting point and boiling points. 12 Hrs

2. ENTROPY:

Concept of entropy, Change of entropy in reversible and irreversible processes with examples. T-S diagrams-Carnot's cycle. Change in entropy during change of state, entropy disorder, heat death. Entropy and second law of thermodynamics. The applications of entropy.Third law of thermodynamics - statement and brief explanation.

Thermodynamic Potentials: Extensive and intensive thermodynamic variables. Thermo-dynamic Potentials U, H, F and G. Maxwell thermodynamic relation-Their definitions, properties and applications , Derivations and applications - TdS equation 10Hrs

3. KINETIC THEORY OF GASES:

Maxwell's law of distribution of velocities (statement and expression).Expression for mean free path.Degrees of freedom, law of equipartition of energy (statement and derivation) Calculation of value of γ for monoatomic, diatomic and triatomic gases.5Hrs

4. REAL GASES :

Comparison between ideal and real gases, isotherms of a real gas, Vanderwal's equation of state –discussion of correction for pressure and volume, expression for critical temperature, volume and pressure. Liquefaction of gases – porous plug experiment with theory – derivation of expression for temperature of inversion. Principle of adiabatic demagnetization. Joule-Thomson Cooling (using Maxwell relation). 6 hrs

5. RADIATION: Distribution of energy in the spectrum of a black body. Wein's displacement law, Wein's law of radiation, Rayleigh- Jeans law. Planck's law of radiation and derivation from the concept of harmonic oscillators – deduction of Wein's law, Wein's displacement law, Rayleigh – Jeans law, and Stefan's law from Planck's law of radiation. Solar constant – temperature of the sun from solar constant.Radiation pressure (definition)

9 Hrs

6. OSCILLATIONS:

Review of simple harmonic motion, expression for frequency from the equation f α –x (derivation). Equation for damped simple harmonic oscillator. Theory of forced vibrations and resonance – mechanical and electrical examples of resonance. Superposition of SHMs, theory of Lissajous figures. 6Hrs

7. WAVES:

Characteristics of wave motion - derivation of general equation of one dimensional progressive wave – differential equation of a wave – complex representation of a wave. Phase of a wave, wave front, expression for intensity of progressive wave(Derivation). Wave groups – phase velocity and group velocity – relation between them. Brief discussion of different types of waves (mechanical waves, seismic waves , water waves and matter waves). 6Hrs

8. SOUND:

Velocity of longitudinal waves : 1) in a gas. Newton's formula, derivation.Laplace correction – variation of pressure in a sound wave.2) Velocity of longitudinal waves in a rod. Theory of

beats.Expression for velocity of transverse waves in a stretched string-derivation. Theory of stationary waves (theory). Doppler Effect- brief explanation.

6 Hrs

NOTE : Sufficient numbers of problems are to be worked out in each section which would enhance the understanding of the subject.

REFERENCES :

1) Heat - D.S. Mathur.

2) Heat and thermodynamics -Brijlal and Subramanyam.

3) Physics volume – I - Halliday and Resnik.

4) Berkely course in Physics - volume – I.

5) Sound - Khanna and Bedi.

6) Refresher course in Physics volume – II - C.L. Arora.

7) University Physics – Sears and Zemansky.

8) Physics of waves and oscillation - Bajaj.

9) Fundamentals of Physics - Halliday and Resnik.

10) Heat -G.K.Nokes.

11) Treatise on heat – Saha and Srivatsava**.**

PRACTICALS –II

(One experiment per week to be conducted in 3 hours duration)

1) q' by Single Cantilever - graphical method.
2) 'q' by Koenig's method - graphical method.
3) Torsion pendulum – M.I of irregular body and rigidity modulus.
4) Parallel axes theorem – using bar pendulum.
5) Static torsion - rigidity modulus - graphical method.
6) Frequency of A.C bysonometer - graphical method.
7) Helmholtz resonator – Velocity of sound.
8) Platinum resistance thermometer- determination of unknown temperature.
9) Stefan's – Boltzmann's law – verification using meter bridge.
10) Thermal conductivity of a good conductor –Searle's method.
11) Thermal conductivity of a bad conductor – Lees and Charlton's method.
12) Searle's double bar – q, n,k and Q .
13) Interference of sound waves – Quinke's method - Velocity of sound
14) 'q' by cantilever oscillation – graphical method.

NOTE:

1. Suitable and relevant experiments may be included.
2. Experiments mentioned in I and II semester may be redistributed depending upon the facilities available in the laboratory.
3. Minimum of 8 experiments should be done in each practical.
4. Experiment should be elaborative so as to extend for 3 hours duration.
5. Error estimation may be included for few experiments.

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THIRD SEMESTER (PAPER- III)

OPTICS AND ELECTROSTATICS

(4 hours of lecture per week)

60 Hours

1.GEOMETRICAL OPTICS:

Optical path, Fermat's principle – statement and explanation.Derivation of Snell's law of refraction using Fermat's principle.*Cardinal points*:Mention of Gauss sign conventions. Meaning of thick lens.Definition and explanations of cardinal points – focal points, principal points and nodal points and corresponding planes, properties of these points and planes.Combination of two thin converging lenses not in contact as an example of combination of two optical systems.*Defects of lenses*:*Abberations* – types, chromatic aberration. Achromatisation of two thin lenses not in contact (derivation). Mention of condition for two thin lenses in contact. Monochromatic aberrations – mention of five types and brief explanation – problems.

8 Hrs

2.*OPTICAL INSTRUMENTS:*

Eye-pieces, Huygen's and Ramsden's eye-pieces - construction, expression for equivalent focal length (derivation), correction for aberrations, positions of principal and focal planes (no derivation). Comparison.

3 hrs

3.WAVE THEORY OF LIGHT:

Wave front, Huygen's principle, explanation of advance of wave front using concept of the secondary waves.Refractive index in terms of velocity (taking refraction of a spherical wave front at a plane surface).Mention of Experimental confirmation of wave theory. Derivation of lens maker's formula in the case of double convex lens using spherical wave front.

3 Hrs

4.INTERFERENCE OF LIGHT:

Review of Young's double slit experiment, coherent sources, conditions for interference. Biprism - explanation, expression for fringe width. Explanation of measurement of distance between two coherent sources $\left(d = \sqrt{d_1 d_2}\right)$. Lloyd's mirror –brief explanation, comparision of interference pattern with Biprism. Interference in thin films – reflected system – derivation, transmitted system

(qualitative). Complimentary nature of the two patterns.Interference due to an air wedge- expression for band width (or wavelength) – derivation.Theory of Newton's rings – reflected system, determination of wavelength and refractive index of a liquid- theory, problems.

Michelson's interferometer – construction and working, formation of interference pattern, Conditions for circular, straight fringes, mention of fringes of equal inclination(Haidingers fringes) and thickness. Applications - determination of wavelength λ and difference in wavelength dλ - Problems. Interference filters(qualitative).

11 Hrs

5. DIFFRACTION OF LIGHT:

Introduction, Types of diffraction. Fresnel's half period zones, expression for radii- (derivation) – Explanation of rectilinear propagation of light. Zone plate – principle, explanation (qualitative).Expression for focal length (no derivation), comparison of zone plate and convex lens. Fresnel's diffraction at a straight edge–positions of maxima and minima, expressions (derivation), graphical representation of variation of intensity in the diffraction pattern. Diffraction at a straight wire(qualitative).Plane transmission grating – normal and oblique incidence (derivation).Dispersive and resolving power of a grating (qualitative) comparison of grating and prism spectra.Problems.

11 Hrs

6. POLARISATION OF LIGHT:

Double refraction in a uniaxial crystal.Optic axis. Mention of biaxial crystals. Principal refractive indices – Huygen's construction for O and E wave fronts in the case of optic axis in the plane of incidence and parallel to crystal surface – oblique and normal incidence (in detail).Retarding plates – production with theory, derivation of general equation for an ellipse and discussion of different cases, expression for the thickness of quarter and half wave plates (mention) – problems. Production and detection of linearly, circularly and elliptically polarized light, (qualitatively explanation). Optical activity- Fresnel's theory. Kerr and Faraday Effect (brief explanation and comparison).

8 Hrs

ELECTROSTATICS:

7. SCALAR AND VECTOR FIELDS:

Concept of scalar and vector fields: Del operator – gradient of scalar function – physical significance. Divergence and curl of a vector function - physical significance with examples, problems. Laplacian

operator-line, surface and volume integrals of a vector function, examples. Gauss divergence theorem, Stokes theorem and their physical meaning (no derivation). Proof of curl grad ϕ = 0 and div curl A = 0.

4 Hrs

8. ELECTRIC FIELD AND POTENTIAL : Electrostatic field, electric flux, expression for flux, Gauss theorem in electrostatics, (both differential and integral form). Application to deduce the expression for the the field near a) charged conductor and force per unit area of its surface (derivation of both). Coulomb's law from Gauss law (derivation) – equivalence of two laws.

The Electric Potential*: Concept of electric potential,* Electric field as the negative gradient of potential. Proof of $E = -\,grad\,V$. ($from\ d\phi = \nabla\phi.dr\ and\ E \cdot dr = -dV$).)Mention of Poisson and Laplace equations, uniqueness theorem (statement).

Work and Energy in Electrostatics: Potential energy. The energy of a continuous charge distribution. (no derivation). Energy density in an electrostatic field, derivation from the example of a parallel plate capacitor.Loss of energy due to sharing of charges between two conductors (derivation by taking a capacitor).

5 Hrs

9.ELECTRIC DIPOLE:

Dielectric Materials: Basic terms, types of polarization in Dielectric Materials . Equation for Potential and field due to a dipole in polar coordinates(derivation). Lorentz local field (derivation) Relation between D and P. $D = \epsilon_o E + P$.(derivation from parallel sided slab in an electric field). Definition and meaning of dielectric susceptibility. Brief account ofpara and ferro electric materials.Clausius – mossotti equation (no derivation).Concept of electrical images- Application to a point charge near the surface of a conducting plane (equation for $\vec{E}$ derivation).

7 Hrs

REFERENCES:

1) Optics- Brijlal and Subramayam
2) Optics and Atomic physics – D.P Khandelwal.
3) Optics and Atomic physics – Satya prakash
4) Electricity and Magnetism – K.K. Tiwari
5) Physics Volume II – Halliday and Resnick

6) Optics – R. Murughesan
7) Electricity and Magnetism - Brijlal and Subramayam
8) Optics – Ajoy Ghatak
9) Fundamentals of Physics – Jenkins and White
10) Electricity and Magnetism – D.N Vasudeva
11) Berkely Physics course – Volume –II

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PRACTICALS –III

(One experiment per week to be conducted in 3 hours duration)

1) Interference at an air wedge – determination of thickness.
2) Newton's rings – determination of radius of curvature.
3) Bi-prism – determination of wavelength.
4) Diffraction at a straight wire - determination of diameter.
5) Diffraction grating – minimum deviation method- mercury spectrum.
6) Polari meter – Specific rotation of sugar.
7) Resolving power of a telescope.
8) Resolving power of a grating.
9) Diffraction at a straight edge - determination of wavelength.
10) L-B photometer – inverse square law & absorption coefficient of glass plate.
11) Charging and discharging of a capacitor- calculation of energy dissipation.
12) de-Sauty's bridge – verification of law combination of capacitances.
13) Impedance of series R-C circuit - determination of frequency of A.C graphical method.

NOTE:

1. Suitable and relevant experiments may be included.
2. Experiments mentioned in III and IV semester may be redistributed depending upon the facilities available in the laboratory.
3. Minimum of 8 experiments should be done in each practical.
4. Experiment should be elaborative so as to extend for 3 hours duration.
5. Error estimation may be included for few experiments.

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IV SEMESTER (PAPER IV)

ELECTRICITY AND ELECTROMAGNETIC THEORY

(4 hours of lecture per week) 60 Hours

1. TRANSIENT CURRENTS:

Growth and decay of current in a series L-R circuit fed with direct emf. Derivation of expression for current in (growth – decay) – graphical representation, explanation of time constant.

Charging and discharging of a capacitor through a resistance – derivation of expression for charge variation in a R-C circuit, mention of expression for voltage and current variation – explanation of time constant in each case.

Series L-C-R circuit fed with direct emf – qualitative discussion- mention of expression for transient charge, condition for oscillation and expression for frequency(no derivation), Problems.

6Hrs

2. ALTERNATING CURRENTS:

Types of AC (sinusoidal and non-sinusoidal) – derivation of expression for mean and RMS values of sinusoidal AC and relation between them.Complex representation of AC using j- operator, phase factor ($\omega t - \theta$). Response of LR, CR and LCR circuits fed with alternating emf – derivation of expressions for current and impedance (using j- notation), phase relation between current and applied emf.

Series resonance – discussion from the expression for current , explanation of half power frequency, band width and quality factor, expression for quality factor in terms of f1, f2 and fr(derivation), significance of Q – factor, effect of resistance, frequency and quality factor. Voltage magnification.

Parallel resonance (LR in parallel with C) expression for current and impedance (no derivation), current magnification.Comparison between series and parallel resonance.Power in an AC circuit- derivation of expression for average power, power factor and its significance.Skin effect (qualitative).Comparison of A C and D C w.r.t characteristics and applications.Problems.

12Hrs

3. NETWORK ANALYSIS:

Mesh current method of circuit analysis. Thevenin's and Norton's theorems – DC and AC statements (proof for DC circuit) – explanation using DC circuits, problems involving both DC and AC circuits. Maximum power transfer theorem – AC and DC statements, proof for DC circuit, and problems with DC circuits. Problems 7 Hrs

4. FREQUENCY FILTERS:

Types of filters– derivation of expression for cut-off frequency in caseof High pass and low pass RC filters. Band pass and band stop filters (qualitative). Application of frequency filters(mention). 2 Hrs

5. RECTIFIERS: Review of rectifiers, Role of filters in rectifiers – C,L and π section filters(qualitative). Zener diode- construction and working – V-I characteristics- zener breakdown voltage. Regulated power supply -Construction and working using zener diode-voltage regulation in case of a) input voltage variation (in detail) and b) load variation (qualitative). Bleeder resistance –action.Problems.

5Hrs

6. ELECTRICAL MEASUREMENTS:

Ballistic Galvanometer – construction and theory of B.G. Charge sensitivity – origin of damping and damping correction. Logarithmic decrement, expression for decrement (derivation). Applications of BG.

Theory of Anderson's and de Sauty's bridges.

Cathode ray oscilloscope – construction of CR tube – block diagram of CRO- brief explanation of function of each block.Time – base with simple circuit – uses of CRO.Measurement of voltage and frequency (using time base and Lissajous figures).Watt meter – watt hour meter (brief explanation).

8Hrs

7. ELECTROMAGNETISM:

Explanation of magnetic field as that produces force on a moving charge – distinction between B and H – Lorentz force on a charge in an EM field, mention of expression F = q (E + V X B) and its explanation. Origin of induced emf in a conducting rod moving in a magnetic field (from force on charged particles).

Ampere's circuital law – statement – proof from line integral over an irregular path which encloses current -comparison of Gauss's law and Ampere's law – application of Ampere's law to calculate magnetic fields due to (a) a straight long conductor (b) a long solenoid. Characteristics of magnetic field- Div B = 0 (qualitative)- concept of magnetic vector potential (brief). Current loop as a magnetic dipole, illustration from the magnetic loop due to a circular current loop- expression for torque on a magnetic dipole in a magnetic field. 9Hrs

8.MAXWELL'S FIELD EQUATIONS:

Deduction of equations from empirical laws of Gauss, Faraday and Ampere.Limitations of Ampere's law, Maxwell's concept of displacement current, derivation of expression for displacement current density from charging of a capacitor – significance of displacement current.

Derivations of EM wave equation(for E and B) for free space, velocity of EM waves, light as an EM wave, EM eave equation for dielectric medium, expression for refractive index. Plane wave solutions of EM wave equation in free space –characteristics of EM waves, transverse nature of EM waves

(derivation), relation between E and B components(qualitative)- to show that E and B are perpendicular to each other- diagram of a plane Polarized EM wave. Poynting theorem, Poynting vector, significance of Poynting vector. Propagation of EM waves in isotropic and dielectric media.

11Hrs

NOTE : Sufficient numbers of problems are to be worked out in each section which would enhancethe understanding of the subject.

REFERENCES:

1) Introduction to Electrodynamics – David J Griffths.

2) Electricity and magnetism – Mahajan A.S and Rangwala.

3) Electricity and magnetism – Berkeley physics course Vol II.

4) Fundamentals of physics – Halliday, Resnick and Walker- sixth edition.

5) Electrodynamics – Jackson.

6) Electromagnetism – B.B. Laud.

7) Fundamentals of Electricity and magnetism – D.N Vasudeva.

8) Electricity and magnetism – Brijlal and Subramanyam.

9) Feynman lectures – vol II.

10) Electricity and magnetism – K.K.Tiwari.

11) Fundamentals of Electricity and magnetism – Arthur F Kip.

12) Electricity and magnetism –R. Murugheshan.

13) Text book of Electronics -Basavaraj.B.

14) Basic electronics–Thereja.

15) Text book of electrical technology – B.L.Thereja.

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PRACTICALS – IV

(One experiment per week to be conducted in 3 hours duration)

1) Series resonance.

2) Parallel resonance.

3) Self-inductance – Anderson's bridge.

4) Dielectric constant – RC circuit.

5) Low pass and high pass filters – cut-off frequency.

6) Helmholtz tangent galvanometer- Reduction factor 'K' and BH

7) Field on the axis of a circular coil – both sides.

8) Network theorems–Maximum power transfer, Thevenin's& Norton's theorems.

9) Half wave rectifiers- without & with filters

10) Full wave rectifiers- without & with filters. (using two diode)

11) Current sensitivity of BG.

12) Diffraction grating – normal incidence.

13) Cauchy's constants – graphical method & direct calculation for two wavelengths.

14) Lloyd's mirror – determination of wavelength.

15) Cornu's fringes – elastic constants.

16) Thermo emf of a thermocouple using potentiometer – melting point.

17) Measurement of L and C by equal voltage method.

NOTE:

1. Suitable and relevant experiments may be included.

2. Experiments mentioned in III and IV semester may be redistributed depending upon the facilities available in the laboratory.

3. Minimum of 8 experiments should be done in each practical.

4. Experiment should be elaborative so as to extend for 3 hours duration.

5. Error estimation may be included for few experiments.

FIFTH SEMESTER (PAPER-V)

ATOMIC PHYSICS, SPECTROSCOPY,LASERS AND ASTROPHYSICS

4 hours of lecture per week 60 Hours

1. ELECTRON:
   i) Properties of electron, e/m of electron by Thomson's method, Charge of an electron by Millikan's oil drop experiment.
   4 Hrs

2. ATOMIC STRUCTURE:
   i) Different types of atomic model- Thomson's atomic model, Rutherford's atomic model, Bohr's atomic models and Sommerfeld's atomic model.(Qualitative explanation of salient features of four model success and limitations - explanation)
   ii) Mention the expression for radius of the orbit, energy of the electron in various orbits, wave number and Rydberg constant according to the Bohr's model(no derivation).- explain with more emphasis on the wavelengths of atomic spectra and Rydberg constant value.
   iii) Effect of finite mass of the nucleus on atomic spectra (with derivation).
   iv) Ratio of masses of electron and proton- using Rydberg constant. 5 Hrs

3. VECTOR ATOM MODEL:
   i) Postulates of vector atom model- a) Space quantization b) Spinning of electron. Detailed discussion of space quantization and spinning of electron.
   ii) Stern and Gerlach experiment –Principle, theory and experimental study.
   iii) Relation between orbital magnetic momentum and the orbital angular momentum of an electron (derivation). Expression for Bohr magnetron.
   iv) Spin magnetic moment of an electron (qualitative discussion only).
   v) Quantum numbers associated with vector atom model (brief explanation of each).
   vi) Pauli's exclusion principle- Statement, explanation and its significance.
   vii) Maximum number of electrons in a sub shell (orbital) and in a shell (orbital)- expression, derivation using Pauli's exclusion principle.
   viii) Spin-orbit coupling: Types L-S coupling and j – j coupling. Brief explanation of each and figure.
   9 Hrs

4. OPTICAL SPECTRA:
   i) Spectral terms, spectral notations (both single electron atom and many electron atoms).
   ii) Selection rules and intensity rules for the spectral lines.

iii) Fine structure of spectral lines- Explanation, discuss by taking Sodium D lines as example.

iv) Zeeman effect-Types of Zeeman Effect, experimental study of Zeeman Effect. Larmor precession- Statement and explanation. Quantum mechanical explanation of normal Zeeman Effect- expression for Zeeman Shift. Quantum mechanical explanation of anomalous Zeeman Effect- Expression for Lande 'g' factor.

v) Paschen–Back effect and Stark effect (qualitative only)

9 Hrs

5. MOLECULAR SPECTRA:

i) Different regions of molecular spectra- origin of molecular spectra.

ii) Pure rotational spectra of diatomic molecules- theory, expression for rotational constant.

iii) Vibrational spectra of a diatomic molecule.

iv) Vibrational – rotational spectra of a diatomic molecule (qualitative explanation).

v) Electronic spectra (qualitative).

vi) NMR and ESR – principle and applications.

7 Hrs

6. SCATTERING OF LIGHT: Coherent and incoherent scattering (brief explanation).Rayleigh scattering (brief explanation).Blue colour of the sky (Reasoning).Raman Effect – Raman spectra, Raman lines- Stoke's and antistoke's lines. Experimental study of Raman Effect. Quantum theory of Raman Effect. Characteristic properties of Raman lines, intensity and polarization of the Raman lines – depolarization factor. Application of the Raman Effect (qualitative).

6 Hrs

7. LASERS: Spontaneous and stimulated emissions. Einstein's coefficients (no derivation). Laser action–condition for laser action, active medium, population inversion, pumping – different methods of pumping. Characteristics of laser light. Ruby and He-Ne lasers – construction, working and energy level diagrams. Semiconductor laser – construction and working. Applications of lasers in Communication – OFC, Scientific research, industries, medicine, military operations and computers (explain all application in brief). HOLOGRAPHY: Hologram – principle of recording and reconstruction, properties and applications of hologram. 8Hrs

8. ASTROPHYSICS: Stars – Distance of a star – stellar parallax method, units of astronomical distances- AU, Ly, Parsec and their relations. Luminosity, brightness of a star and their relations. Magnitude of a star-apparent and absolute magnitude of a star-Relation between them. Spectral classification of stars (as per different surface temperature). H-R diagram- explanation about the diagram. Calculation of mass, mean density, radius and temperature of sun. Derivation of the expression for internal

temperature of a star. Expression for Internal pressure of a star (no derivation). Photon diffusion time- explanation. Mass-Luminosity relation for a star (derivation) and explanation. The relation between life time of a star and it's mass. Sources of stellar energy (qualitative).

Evolution of stars – conditions for main sequence star, red giants, white dwarfs and neutron stars and black holes.

9 Hrs

9. COSMOLOGY: Expansion of universe, Hubble's law-statement and explanation, Age of the universe using Hubble's law. Big Bang theory-explanation, experimental evidence for Big Bang model- CMBR, Nucleo synthesis(qualitative).

   3 Hrs

FIFTH SEMESTER (PAPER-VI)

GENERAL & SPECIAL THEORY OF RELATIVITY, STATISTICAL MECHANICS,

QUANTUM MECHANICS, NANO PHYSICS.

(4 hours of lecture per week)

60 Hours

1. SPECIAL THEORY OF RELATIVITY:

Concept of Newtonian mechanics, space, time, mass, frame of reference, Newtonian relativity, Galilean concept, Galilean transformation equations,.Relativity concept of physical quantities.Ether hypothesis, Michelson – Morley experiment – experimental setup, principle, equation for path difference (no derivation), significance of null result of experiment, (absoluteness of velocity of light), postulates of Einstein special theory of relativity.Lorentz – transformation equations (no derivation).Length contraction, time dilation, Relativity of simultaneity, velocity addition theorem (simple derivation).

Relativistic dynamics: Mass variation (no derivation), mass – energy relation (derivation), relativistic expression for kinetic energy,energy - momentum relation. Classical and relativistic concepts of space and time, Minkowski's world, concept of four vectors, $(xyz, \sqrt{-1}\, ct)$, world line, space-time interval and its invariance.

15 Hrs

2.GENERAL THEORY OF RELATIVITY:

Inertial and gravitational mass, principle of equivalence, curved space time, Einstein theory of gravitation (brief).Experimental verification of general theory of relativity- brief explanation of effect of gravitational field: on a ray of light, on path of a planet about the sun and relativistic Doppler effect.

5 Hrs

3. QUANTUM MECHANICS:

Wave particle duality, de Broglie concept of matter wave, de Broglie wavelength, group velocity and phase velocity of de-Broglie waves, characteristics of matter waves, Davisson – Germer experiment- experimental set up and procedure (derivation).

Heisenberg uncertainity principle – physical significance – non-existence of electrons in the nucleus – radius of Bohr' orbits – γ ray Microscope experiment – wave function, physical significance, Born interpretation of wave function.Basic postulates of wave mechanics

(statement and brief explanation).Quantum mechanical operators – position, energy, linear momentum and angular momentum. Commutator of position and momentum operators.
Time Independent and Time Dependent Schrondinger wave equations (both derivations)– Normalization – properties, Eigen values, – Eigen functions. Application of Schrodinger Time Independent wave equation – Free particle in one dimensional potential box (Derivation for $E_n \; and \; \Psi_n$), zero point energy.Three Dimensional potential box (Qualitative). Simple harmonic oscillator and hydrogen atom - Eigen energy and functions (brief discussion) Problems 20 Hrs

4.STATISTICAL MECHANICS:

Necessity of statistical approach, microscopic and macroscopic states, ensembles, probability, thermodynamic probability, phase-space, fundamental postulates of statistical mechanics, , equilibrium state, density of states. Types of statistical laws – distinguishing features of three statistical systems with examples. Classical statistics- M-B statistical distribution function(no derivation). Quantum statistics: F-D and B-E statistical distribution functions (both derivation).Comparison of MB-BE-FD statistics. Energy density Vs frequency graph of Black body radiation (brief explanation) -derivation of Planck's law from B-E statistics.

10 Hrs

5. NANO PHYSICS:

Concept of Nanotechnology, material science, Nanotechnology, nano structural materials, graphite. Properties of nanomaterial : mechanical, chemical, magnetic, - applications. Fullerenes (carbon- 60), carbon nanotubes - production by air discharge method, properties. Nano electronics;- semiconductor structures, quantum wells, quantum wires, quantum dots, quantum computers, applications. Nano medicines (brief explanation)

7 Hrs

6. LIQUID CRYSTALS: Classification, properties and applications.

2 Hrs

NOTE : Sufficient numbers of problems are to be worked out in each section which would enhancethe understanding of the subject.

REFERENCES:

1) Modern physics – R.Murugheshan and KiruthigaPrasath.
2) Berkeley physics course – Vol 3, 4 and 5.
3) Theory of space, time and gravitation- S.G.Pimpale.
4) Special theory of relativity – Resnick.
5) Lasers and Non-linear optics – B.B.Laud.
6) Lasers – Tyagarajan and Ghatak.
7) Quantum mechanics – Arul das.
8) Introductory quantum mechanics – Y.R.Waghmare.
9) Fundamentals of physics – Halliday, Resnick and Walker- sixth edition.

V SEMESTER PRACTICAL – V

(One experiment per week to be conducted in 3 hours duration)

1. e/m of an electron –Thomson Method –graphical calculation
2. Capacity of condenser using B.G –graph of deflection Vs voltage
3. LCR circuit –measurement of frequency voltage and phase difference using CRO
4. Full wave bridge rectifier –display of waveform, ripple factor, with and without filter.
   Graph I_{dc} V_s V_{dc}
5. Hysteresis curve (B-H loop) for a ferromagnetic substance
6. Absorption spectrum of $KMnO_4$ – Determination of wavelength λ
7. G.M Counter –Characteristics $\left(N \pm \sqrt{N}\right)$ V_S V graph.-Operating Voltage.
8. LASER –wavelength and particle size by diffraction grating
9. Thermionic emission- determination of work function.
10. Triode characteristics – anode and mutual characteristics – Determination of $r_p, g_m and \mu$

NOTE:

1) Suitable and relevant experiments may be included.
2) Experiments mentioned in V and VI semester may be redistributed depending upon the facilities available in the laboratory.
3) Minimum of 8 experiments should be done in each practical.
4) Experiment should be elaborative so as to extend for 3 hours duration
5) Error estimation may be included for few experiments.

V SEMESTER PRACTICAL – VI

(One experiment per week to be conducted in 3 hours duration)

1. Thermionic emission- determination of work function.
2. Determination of Planck's constant and work function using photo tube.
3. High resistance by leakage –graphical and direct method - correction for leakage resistance of capacitor.
4. Dielectric constant using R C circuit.
5. Verification of Malu's law using Laser light.
6. Lissajousfgures-Determination of unknown frequency.
7. G M Counter – Nuclear counting Statistics.
8. Verification of probability theorems using 1,2 and 10 coins.
9. LDR- absorption coefficient of glass using laser or ordinary light.
10. Solar cell characteristics.
11. Zener diode as voltage regulator (input voltage and load resistance variation)

NOTE:

1. Suitable and relevant experiments may be included.
2. Experiments mentioned in V and VI semester may be redistributed depending upon the facilities available in the laboratory.
3. Minimum of 8 experiments should be done in each practical.
4. Experiment should be elaborative so as to extend for 3 hours duration.
5. Error estimation may be included for few experiments.

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SIXTH SEMESTER (PAPER-VII)

SOLID STATE PHYSICS AND ELECTRONICS

(4 Hours Of Lecture Per Week) 60 Hours

1. Crystallography:Introduction, crystal lattice and translation vectors, unit cell, Bravias lattice. Types of lattice – 2-D and 3-D lattice. Lattice directions and planes. Miller indices- Bravias lattice in 3D- crystal systems , inter planar spacing- relation with (h,k,l) and intercepts.

Symmetry operations- brief discussion, concept of point and space group.

X-rays- introduction, Production-brief explanation, Types of X-rays-soft and hard –X-rays (mention).

Scattering Of X-Rays:Laue's work. Bragg's law of diffraction, derivation of $2d\sin\Theta = n\lambda$.

Compton Scattering:Explanation, equation for Compton shift (derivation) – discussion of different cases, comparison of Raman effect and Compton effect.

X-Ray Spectra: Continuous spectra-λVsI graph and V Vsν_{max} graph, origin due to inverse photo electric effect-Duane-Hunt empirical law.

Characteristic spectrum- Origin due to electronic transition.(K,L,M,N shell diagram) Mosley's law, explanation using Bohr's theory. Significance of Mosley's law- arrangement of periodic table, determination of atomic number and position of an element (mention).

10 Hrs

2. SPECIFIC HEAT OF SOLIDS: Dulong and Petit's law – statement and derivation from classical theory.- Einstein's theory – assumption, equation for specific heat capacity (no derivation), merits and demerits. Debye's theory: Assumption- derivation of Debye's formula, application to (i) High temperature- agrees to Dulong-Petit's law, (ii) Low temperature – Debye's T^3 law, problems.

4 Hrs

3. FREE ELECTRON THEORY OF METALS: Limitations of classical theory, Quantum Free Electron Theory of Metals- Sommerfeld's model- assumptions, energy state of free electrons in metal – obey F-D Statistics and Pauli's principle. Density of states, derivation of expression for Fermi energy, - Average energy at absolute zero, E_0=3/5E_f(0), mention of Fermi velocity and Fermi temperature.-application to electrical conductivity- qualitativeexplanation- collision time Ƭ as a function of E_f, mention of equation $\sigma = \frac{ne^2\tau(E_f)}{m}$.

6 Hrs

4. Band theory of solids:Brief review of concept of energy bands and classification of solids.

Semiconductors:Intrinsic semiconductor –equation for concentration of charge carriers in valance band and conduction band (for n and p - derivation).

Law of mass action- $np = n_i^2 = AT^3 e^{-Eg/kT}$. Equation for Fermi level. Fermi level lies at the centre of forbidden gap. Statement and derivation of equation for electrical conductivity.$\sigma = |e|n(\mu_n + \mu_p)$.

Extrinsic semiconductor : P and N type – explanation using energy bands – diagram, formation of acceptor and donor levels (accepter level in p type and donor level in n type), equation for Fermi level-derivation in both cases (E_F for n & p), temperature dependence of Fermi level. Equation for electrical conductivity.$\sigma_n = e\, N_d\, \mu_n$, $\sigma_p = e\, N_a\, \mu_p$- brief explanation.

Hall Effect: Theory- expression for hall voltage and hall coefficient, relation between R_H *and* μ. Mention of applications.

9 Hrs

5. *MAGNETIC PROPERTIESOF MATETIALS:*Dia-, Para-, Ferri- and Ferromagnetic Materials. - Origin of dia, para and ferromagnetism on the basis of electronic structure of atoms.Variation of susceptibility with temperature. Classical Langevin's theory of dia – and Paramagnetic Domains.

Ferromagnetism- Weiss theory ofFerromagnetism and hysteresis. Domains- origin and effect due to magnetism, hysteresis- explanation , significance of hysteresis loss, application of ferromagnetic materials.

5 Hrs

4.SUPERCONDUCTIVITY:Experimental observations – Transition temperature, persistent current, Isotope effect, Meissner effect. – Principle of magnetic levitation.(Qualitative)

Effect of magnetic field on super conductor - (M Vs H graph) – critical field. Type-I and Type-II super conductors - mention of application.

Theory of super conductivity: BCS theory – qualitative explanation–concept of phonon field in a lattice,formation of cooper pair, exchange of phonons. Brief explanation of energy gap due to super conductivity

High temperature superconductors - Recent advances, Applications.(1) construction of electromagnets, (2) transmission of electric power (super conducting cables), (3) magnetic shielding.

5 Hrs

5.SOLID STATE ELECTRONICS:

Transistors: Different configurations, biasing- self biasing of CE circuit – voltage divider method – circuit operation, input and output equations.

Hybrid parameters- Definition for a linear circuit- notation, equations and equivalent circuit for CE configuration.

Transistor as an amplifier in CE mode- practical circuit of single stage CE amplifier- circuit operation, DC load line, Q-point, AC load line. Derivation of expression for $Z_i\ A_v\ A_i\ and\ A_p$ interms of h-parameters, approximation. Frequency curve response and band width.

Oscillators:Basic LC oscillatory circuit - damped and undamped oscillations. Feedback amplifier, positive and negative feedback, comparison (with respect to gain, stability and band width), Barkhausen's criterion for sustained oscillation - Explanation using the equation $A_F = A/(1 - A_m)$. Phase-shift oscillator- Circuit diagram, principle, circuit operation, equation for o/p frequency (no derivation), advantages.

Multivibrators- distinguishing features of different types,(Mono, Bi and Astable), uses of multivibrators. Astablemultivibrators– transistorized circuit, circuit operation, waveform, switching time and frequency of oscillation (No derivation).

Integrated circuits:Types of Integrated circuits (brief) and their advantages and disadvantages(comparison with discrete components with respect to size, power consumption and reliability)

Field effect transistor: Types (mention). JFET-construction of N-channel JFET, principle of working (qualitative), common source configuration – circuit diagram, characteristics (drain and mutual), definition of r_d, $g_m\ and\ \mu$. Application of FET (Mention).Comparison with BJT.

Operational amplifier: Symbol, Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain. $(mention\ of\ R_{i,}R_{o,}\ A_{V,}\ Band\ width, CMRR)$.Concept of Virtual ground, Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, equation for gain (derivation - inverting and non-inverting cases), Frequency response and band width. (2) Adder-half and full adder (3) Subtractor, (4) Differentiator, (5) Integrator.(BRIEF EXPLANATION OF EACH)

13 hrs

6.Digital Electronics:Brief review of logic gates. Realization of basic gates using NAND and NOR gates. EX-OR gate – symbol, truth table. Mention of IC gates(Ex : 7400 and 7402).

Boolean algebra: Basic laws (statement) De-Morgan's theorem –statement and brief explanation. Boolean expressions –simple equations and their realization using gates- problems on writing logic diagrams, logic equations, truth table and simplification of equation.

Flip-Flops: Basic principle of Flip-Flop circuits. RS Flip-Flop –symbol, brief explanation using logic diagram and truth table, draw backs. Clocked RS flip-flop (principle only) truth table.J-K flip-flop s in detail. M/S J-K flip flop (brief discussion), brief discussion of registers and counters

5 Hrs

7. Communication: Radio communication: Modulation: Review of principle, frequency spectrum of AM. Equation for AM modulation (no derivation) – Current and power calculation. FM Modulation –Principle (brief). Comparison of AM and FM modulation, AM transmitter- block diagram, explanation. AM receiver- Super Heterodyne Receiver- block diagram, explanation, characteristics of radio receiver, sensitivity, selectivity, and fidelity (brief). Advantages of SHR.

5 Hrs

Note: Sufficient numbers of problems are to be worked out in each section which would enhance theUnderstanding of the subject.

Sixth Semester

Paper VIII: Nuclear and particle physics

(4 hours of lecture per week) 60 hours

1. **General Properties of Nuclei:**Constituents of nucleus and their Intrinsic properties, quantitative facts about size, mass, charge density (matter energy), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states.

5 hrs

2. **Radioactivity:** stability of nucleus; Law of radioactive decay; Mean life & half-life; Law of successive disintegration- radioactive equilibrium – Transient and Secular equilibrium. Radioactive dating**.** (a) Age of earth, (b) Age of rock Carbon dating (c) Estimate the age of wood and Problems.

5 Hrs

3. **Radioactivity decay**:(a) Alpha decay: basics of -decay processes, theory of - emission, Gamow theory(Qualitative) Geiger- Nuttall law, (b)Beta -decay: energy kinematics for -decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. Mossbauer effect. (in brief)

6 Hrs

4. **Detector for Nuclear Radiations: Classification of detectors. Gas detectors:** GM Counter. (in detail).Scintillation counter- Basic principle of Scintillation. Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors: HpGe detector (in Brief)

5 Hrs

5. **Particle Accelerators:** Accelerator facility available in India: Van-de Graff generator (Tandem accelerator), Linear accelerator (qualitative0H Cyclotron and Betatron (in detail) Standard Model of Particle physics, Brief Discussion of LHC and LIGU.

5 Hrs

6. **Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct reaction, resonance reaction.** Artificial radioactivity- artificial transmutation.

5Hrs

7. **Nuclear forces and models :**
   Nuclear force: Characteristics of nuclear forces, Meson theory of nuclear forces.

Nuclear models: Liquid drop model approach, semi empirical mass formula and significance of various terms, condition of nuclear stability. Shell model- basic assumption of shell model, Evidence for nuclear shell structure, nuclear magic numbers.

5 Hrs

8. **Fission and fusion** - Types of fission – distribution of fission fragments – liberation of neutrons. Fissile and fertile materials. Nuclear reactor: classification, power reactor (in Detail), Four factor formula (Derivation)
   Nuclear fusion –thermonuclear reactions – sources of stellar energy. p-p chain reaction, CNO chain reactions.

   5 Hrs

9. **Interaction of Nuclear Radiation with matter:**Energy loss due to heavy charged particles and electrons passing through matter, Cerenkov radiation, Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter.(qualitative)

   5 Hrs

10. **Particle physics**: classification of elementary particles and types of interactions , basic features. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons.

    6 hrs

11. **Cosmic Rays:** Discovery, primary and secondary cosmic rays. Altitude, latitude effect, east – west asymmetry. Cosmic ray showers – Bhabha's theory. Origin of cosmic rays.

    3 hrs.

12. **Renewable energy sources:** : Introduction to energy sources, primary energy sources, secondary energy sources, supplementary source.
    Solar energy: Solar energy and its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning.
    Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

    5 Hrs

VI SEMESTER PRACTICAL – VII

(One experiment per week to be conducted in 3 hours duration)

1. FET characteristics – drain and transfer characteristics, determination of $r_p, g_m and \mu$
2. CE amplifier –frequency response, band width and gain band width.
3. OP – AMP: – using IC 741 – inverting amplifier, frequency response, gain calculation for different feedback resistances, - band width and gain band width.
4. Logic gates: Construction and study of AND, OR, NAND, and NOR gates using IC7400
5. Astable multivibrator –using transistor –determination of output frequency and duty cycle.
6. Determination of h-parameter for CE – mode.
7. Phase shift oscillator –using transistor or IC.
8. G.M counter – Verification of inverse square law.
9. Earth inductor –determination of B_H and B_v .
10. RS Flip Flop: Construction using IC and verification of truth table. Demonstration of action of clocked pulse.
11. Rydberg constant – By hydrogen discharge tube or solar hydrogen spectrum
12. Photo tube –Verification of inverse square law of radiation.
13. Frank-Hertz Experiment.

NOTE:

6. Suitable and relevant experiments may be included.
7. Experiments mentioned in V and VI semester may be redistributed depending upon the facilities available in the laboratory.
8. Minimum of 8 experiments should be done in each practical.
9. Experiment should be elaborative so as to extend for 3 hours duration.
10. Error estimation may be included for few experiments.

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VI SEMESTER PRACTICAL – VIII

(One experiment per week to be conducted in 3 hours duration)

1. Transistor characteristics.
2. OP – AMP – using IC 741 – non - inverting amplifier, frequency response, gain calculation for
   different feedback resistances, - band width and gain band width.
3. OP AMP: Filter circuits.
4. Logic gates: Construction and study of AND, OR, NAND, and NOR gates using IC 7402
5. Astablemultivibrator: - using IC -555 – determination of output frequency and duty cycle.
6. Energy gap of semiconductor using meter bridge- determination of unknown temperature (melting point of wax) by graph.
7. Mutual inductance by absolute method using B.G.
8. G.M counter – Absorption coefficient of aluminum.
9. Hall Effect: Measurement of Hall co – efficient.
10. AM – Modulator and demodulator –construction using transistor or IC –measuring depth of modulation.
11. Determination of Fermi energy of copper using meter bridge.
12. FET Amplifier – Common source – frequency response, band width and gain bandwidth

NOTE:

1. Suitable and relevant experiments may be included.
2. Experiments mentioned in V and VI semester may be redistributed depending upon the facilities available in the laboratory.
3. Minimum of 8 experiments should be done in each practical.
4. Experiment should be elaborative so as to extend for 3 hours duration.
5. Error estimation may be included for few experiments

KUVEMPU UNIVERSITY

SYLLABUS

COURSE: B. Sc. MATHEMATICS

Revised on: 2017-18

With Effective from A/Y: 2018-19

DEPARTMENT OF PG STUDIES AND RESEARCH IN MATHEMATICS,
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Structure of B.Sc. Mathematics papers

Semester	Title of the paper		Teaching hrs/week	Duration of Exam (hrs)	IA MARKS	EXAM MARKS	TOTAL MARKS	Semester Total
I	BSM 1	Theory	5 hrs	3 hrs	10	70	80	100
		Practical	3 hrs	3 hrs	-	20	20*	
II	BSM 2	Theory	5 hrs	3 hrs	10	70	80	100
		Practical	3 hrs	3 hrs	-	20	20	
III	BSM 3	Theory	5 hrs	3 hrs	10	70	80	100
		Practical	3 hrs	3 hrs	-	20	20	
IV	BSM 4	Theory	5 hrs	3 hrs	10	70	80	100
		Practical	3 hrs	3 hrs	-	20	20	
V	BSM 5	Theory	4 hrs	3 hrs	10	70	80	100
		Practical	2 hrs	3 hrs	-	20	20	
	BSM 6	Theory	4 hrs	3 hrs	10	70	80	100
		Practical	2 hrs	3 hrs	-	20	20	
VI	BSM 7	Theory	4 hrs	3 hrs	10	70	80	100
		Practical	2 hrs	3 hrs	-	20	20	
	BSM 8	Theory	4 hrs	3 hrs	10	70	80	100
		Practical	2 hrs	3 hrs	-	20	20	

* **In the Practical component outof 20 marks: 15 for practical exam + 3 for vivo +2 for lab record.**

KUVEMPU UNIVERSITY

Syllabus

B.Sc. Mathematics (Theory and Practicles)

I SEMESTER

Paper - BSM 1: Algebra - I and Calculus - I

Total: 78 Hrs

Matrices: Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction, Echelon form, Rank of a matrix; Inverse of a matrix by elementary operations; Solution of system of linear equations; Criteria for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Eigen values and Eigen vectors of square matrices, real symmetric matrices and their properties, reduction of such matrices to diagonal form, Cayley-Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem.

02hrs/week=30hrs

Polar Co-ordinates: Polar coordinates, angle between the radius vector and tangent. Angle of Intersection of curves (polar forms), pedal equations. Derivative of an arc in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms- center of curvature.

Successive Differentiation: nth Derivative of $(ax+b)^m$, $\log(ax+b)$, e^{ax}, $e^{ax}\sin(bx+c)$, $e^{ax}\cos(bx+c)$, $\sin(ax+b)$, $\cos(ax+b)$, Leibnitz theorem (with proof) and applications.

Function of two and three variables: continuity, partial derivatives EULERS Theorem, maxima and minima (Two variables).

03hrs/week=48hrs

Reference Books:

1. Topics in Algebra - I N Herstain, Publisher John Wiley & Sons.
2. University Algebra - N.S. Gopalakrishnan, New Age International (P) Limited
3. Theory of Matrices - B S Vatsa, New Age International Publishers.
4. Matrices - A R Vasista, Krishna Prakashana Mandir.
5. Elements of Real Analysis - Shanti Narayan, S. Chand & Company, New Delhi.
6. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi.
7. Calculus – Lipman Bers, Holt, Rinehart & Winston.
8. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt. Ltd., vol. I & II.
9. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill., 2008.

PRACTICAL – 1:

Total: 42Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(3 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

Level - 1: Fundamental Computer Applications

1. **Word:** Creating documents, saving in personal folders, sending files to the other users through email-id (documents include all kind of mathematical equations with Greek letters, differentiations, integrations, matrices, vectors, etc.).
2. **Excel:** Creating documents, save in personal folders, sending files through emails to other users (documents contains employees' salaries, students' marks with total, average, division, student attendance list, etc.).
3. **Power point:** Create power point presentation documents which includes Mathematical equations and solutions, programs copy from Scilab, Maxima etc.
4. **Mails creation:** Creating email-id through sign up through Google/Yahoo/Rediff etc. attaching files, sending messages to other mail-ids.

3 hrs/week - 12 hrs.

Level - 2: Basics in Scilab and Maxima

1. **Procedure of opening Scilab console and Scilab notes.**
   a) Writing mathematic functions and commands on console.
   b) Writing procedure – syntax in Sci-notes (i) If, (ii) If-else, (iii) nested-if, (iv) while-loop, (v) for-loop with example, (vi) Arrays, etc.

   Examples:
   - Various commands on Matrices (Addition of matrices, Multiplication of matrices, Inverse of the Matrix, etc.)
   - Programs to find the age for eligible to vote.
   - Programs to calculate the total and average of marks of students and check the division.
   - Program to reduce the given matrix into lower triangular and upper triangular matrices
   - Program to find Row reduced echelon form and normal form forgiven matrices.
   - Program to test consistency of system of linear equations and solutions.

   3 hrs/week - 15 hrs.

2. **Procedure of opening Maxima window for writing commands and programs.**
   a) Writing mathematic functions and commands on Maxima window.
   b) Writing procedure – syntax in Maxima window (i) If, (ii) If-else, (iii) nested-if, (iv) while-loop, (v) for-loop with example, (vi) Arrays, etc.

   Examples:
   - Various commands on Matrices (Addition of matrices, Multiplication of matrices, Inverse of the Matrix, etc.)
   - Programs to find the age for eligible to vote.
   - Programs to calculate the total and average of marks of students and check the division.
   - Program to find Eigen values and Corresponding Eigen vectors of the matrix using MAXIMA.

- Program to verify the Cayley-Hamilton theorem for given matrix using MAXIMA
- Introduction to Maxima and commands for successive derivatives and Leibnitz rule.

3 hrs/week - 15 hrs.

II SEMESTER

Paper - BSM 2: Algebra – II and Calculus - II

Total: 78 Hrs

Groups: Definition of a group with examples and properties, Problems there on, Subgroups, center of groups, order of an element of a group, order of a group, cyclic groups, Coset decomposition, Lagrange's theorem and its consequences. Fermat's theorem and Euler's theorem.

02hrs/week=30hrs

Theory of plane Curves: Asymptotes, envelopes, singular points, cusp, node, and conjugate points.

Mean value Theorems: Continuity and differentiability (Definitions only). Theorems on derivatives: Rolle's Theorem, Lagrange's mean value theorem and Cauchy mean value theorem. Taylor's and Maclaurin's series (problems only).

L'Hospital's rule: Statement of L' Hospital's rule and problems there on.

02hrs/week=32hrs

Integral calculus: Recapitulation of Algebraic rational and irrational functions and rational functions involving trigonometric functions and definite integrals. Reduction Formulae for $\int sin^n x$, $\int cos^n x$, $\int tan^n x$, $\int cot^n x$, $\int sec^n x$, $\int cosec^n x$, $\int sin^m x \, cos^m x dx$ with definite limit. Differentiation under the integral sign by Leibnitz rule.

01hrs/week=16hrs

Reference Books:

1. Higher algebra - Bernard & Child, Arihant, ISBN: 9350943199/ 9789350943199.
2. Topics in Algebra - I N Herstain, Wiley Eastern Ltd., New Delhi.
3. Modern Algebra - Sharma and Vasishta, Krishna Prakashan Mandir, Meerut, U.P.
4. Analytical Solid Geometry - Shanti Narayan, New Delhi: S. Chand and Co. Pvt. Ltd., 2004
5. Textbook of BSc Mathematics - Chakravarthy L.N, Vol 1, ISBN: 1234567176244, Chethana Book House
6. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi.
7. Integral Calculus - Shanti Narayan and P K Mittal, S. Chand and Co. Pvt. Ltd.,
8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill., 2008.

PRACTICAL - 2

Total: 42 Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(3 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

LIST OF PROGRAMMES

1. Program to construct Cayley table and test abelian for given finite set using SCILAB.
2. Program to test abelian group properties for given finite set using SCILAB
3. Program to find all possible cosets of the given finite group using SCILAB
4. Program to find all generators and corresponding all possible subgroups for the given cyclic group using SCILAB
5. Programs to verify Lagrange's theorem for given finite group.
6. Program to verify the Euler's theorem for given finite group using SCILAB.
7. Programs for finding limits by comparing left and right limits using MAXIMA
8. Programs for testing continuity of the function at $x = a$ and x in $[a, b]$ using MAXIMA
9. Programs for testing differentiability of the function at $x = a$ and x in (a, b) using MAXIMA
10. Programs to verify Rolle's theorem for given function using MAXIMA
11. Programs to verify Lagrange's mean value theorem for given function using MAXIMA
12. Programs to verify Cauchy's Mean value theorem using MAXIMA
13. Programs to verify Taylor's Mean value theorem using MAXIMA
14. Programs to construct series using Maclaurin's series
15. Programs to find limit of the function using L'Hosptal's rule.

III SEMESTER

Paper - BSM 3: Algebra - III and Differential Equations - I

Total: 78 Hrs

Group Theory: Normal Subgroups, definition, examples and standard theorems on normal subgroups**.** Quotient groups, Homomorphism, isomorphism and fundamental theorem of homomorphism of groups.

02hrs/week=30hrs

Ordinary Differential Equation: Definition of an ordinary differential equation, its order and degree. Classification of solutions. Solution of first degree and first order equations.
(1) Variable separable
(2) Homogeneous and reducible to homogeneous form.
(3) Linear and Bernoulli's form
(4) Exact equations and reducible to exact form with standard I.F. Necessary and sufficient condition for the equation to be exact.

Equations of first order and higher degree. Solvable for p, Solvable for x (singular solutions), Solvable for y (singular solutions) and Clairaut's equation. Orthogonal trajectories. Second and higher order linear differential equations with constant co-efficient, complementary functions, Particular integral, standard types, Cauchy-Euler differential equations. Simultaneous differential equations with constant co-efficient (two variables).

03hrs/week=48hrs

Reference Books:

1. Higher algebra - Bernard & Child, Arihant, ISBN: 9350943199/ 9789350943199.
2. Topics in Algebra - I N Herstain, Wiley Eastern Ltd., New Delhi.
3. Modern Algebra - Sharma and Vashishta, Krishna Prakashan Mandir, Meerut, U.P.
4. Textbook of BSc Mathematics - Chakravarthy L.N, Vol 2, ISBN:1234567176245, Chethana Book House.
5. Ordinary and Partial Differential Equations - M D Raisinghania, S. Chand and Co. Pvt. Ltd.
6. Schaum's outline of theory and problems of Differential Equations - Frank Ayres, McGraw-Hill Publishing Co.
7. Differential Equations and Its Applications - S Narayanan and T K Manicavachagom Pillay, S V Publishers Private Ltd.
8. Differential equation with Applications and Historical Notes - G F Simmons, 2nd ed. McGraw-Hill Publishing Company.

PRACTICAL - 3

Total: 42 Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(3 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

LIST OF PROGRAMMES

1. Program to test normality of a given subgroup and a group using SCILAB.
2. Program to test homomorphism of a give function from $G \rightarrow G'$using SCILAB.
3. Program to test isomorphism of a given function from $G \rightarrow G'$ using SCILAB.
4. Program to find the solution of given differential equation using Maxima and plotting the Solution-I. (1st order 1st degree non-linear)
5. Program to find the solution of given differential equation using Maxima and plotting the solution-II. (1st order 1st degree linear)
6. Program to find the solution of given differential equation using Maxima and plotting the solution-III. (1st order but not of 1st degree)
7. Program to find complementary function and particular integral of given differential equation with constant coefficients.
8. Program to find solution of given simultaneous differential equations with constant coefficients.
9. Programs for plotting curves in 2D Plane which are in Cartesian form.
10. Programs for plotting curves in 2D Plane which are in polar form.
11. Programs for plotting curves in 2D Plane which are in Parametric form.
12. Programs for plotting curves in 3D space using MAXIMA/SCILAB.

IV SEMESTER

Paper - BSM 4: Differential Equations - II and Analysis

Total: 78 Hrs

Ordinary Linear Differential Equations: Solution of ordinary second order linear differential equation with variable coefficients by the methods:
1. When a part of complementary function is given,
2. Changing the independent variable,
3. Changing the dependent variable,
4. When a first integral is given (exact equation),
5. Variation of parameters

02hrs/week=30hrs

Sequence of Real Numbers: Definition of a sequence, limits of a sequence, algebra of limit of a Sequence-Convergent, Divergent and Oscillatory sequence problems there on. Bounded sequence; every convergent sequence is bounded-converse is not true, Monotonic Sequence and Their properties, Cauchy's sequence.

Infinite Series: Definition of convergent, divergent and oscillatory of series - standard properties and results, Geometric and Hyper geometric series. Cauchy's criterion (statement only). Tests of convergence of series - comparison tests - D'Alemberts Ratio test - Raabe's test - Cauchy's root test. The Integral test - Absolute Convergence and Leibnitz's test for alternating series.

03hrs/week=48hrs

Reference Books:

1. Ordinary and Partial Differential Equations - M D Raisinghania, S. Chand and Co. Pvt. Ltd.
2. Schaum's outline of theory and problems of Differential Equations - Frank Ayres, McGraw-Hill Publishing Co.
3. Differential Equations and Its Applications - S Narayanan and T K Manicavachagom Pillay, S V Publishers Private Ltd.
4. Differential equation with Applications and Historical Notes - G F Simmons, 2nd ed.: McGraw-Hill Publishing Company.
5. Elements of Real Analysis - Shanti Narayan, S. Chand & Company, New Delhi.
6. Mathematical Analysis - S. C. Malik, Savita Arora, New Age Science Ltd.
7. Principles of Mathematical Analysis - Walter Rudin, McGraw-Hill Publishing Company.

PRACTICAL - 4

Total: 42 Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(3 hours/ week per batch)
Softwares used: 1. Maxima

2. Scilab

LIST OF PROGRAMMES

1. Program to find the solution of Differential Equations by finding complimentary functions
2. Program to find the solution of Differential Equations by changing independent variable.
3. Program to find the solution of Differential Equations by changing dependent variable.
4. 4Program to test for exactness and solve the Differential Equations of second order.
5. Program to illustrate convergence, divergence or oscillatory of the given sequence using SCILAB/MAXIMA.
6. Program to illustrate convergence, divergence or oscillatory of the given series using SCILAB/MAXIMA.
7. Using Cauchy's criterion to determine convergence of the given sequence.
8. Using Cauchy's criterion to determine convergence of the given series.
9. Program to test the convergence of the series using Leibnitz's theorem.

V SEMESTER

Paper - BSM 5: Differential Equations– III, Fourier series and Algebra-IV

Total: 60 Hrs

Total and Simultaneous Differential Equations: Necessary condition for the equation $P\,dx + Q\,dy + R\,dz = 0$ to be integrable-problems there on. Solutions of equation of the $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$.

Partial Differential Equations: Formation of partial differential equation –Lagrange's linear equation:$Pp + Qq = R$. Four standard types of first order partial differential equations, Charpit's methods.

Fourier Series: Periodic functions and properties-Fourier series of functions with period 2π and period 2L. Half range cosine and sine series.

02hr/week=30hrs

Rings, Integral Domains and Fields: Rings- Definition, Types of rings. Examples properties of rings - Rings of Integers Modulo-n - Integral domains - Fields. Examples - subrings - Ideals -Principal ideals, Maximal ideal commutative rings, examples and standard properties- Homomorphism and Isomorphism - properties of homomorphism of rings. Quotient rings.

02hrs/week=30hrs

Reference Books:

1. Ordinary and Partial Differential Equations - M D Raisinghania, S. Chand and Co. Pvt. Ltd.
2. Schaum's outline of theory and problems of Differential Equations - Frank Ayres, McGraw-Hill Publishing Co.
3. Differential Equations and Its Applications - S Narayanan and T K Manicavachagom Pillay, S V Publishers Private Ltd.

4. Differential equation with Applications and Historical Notes - G F Simmons, 2nd ed.: McGraw-Hill Publishing Company.
5. Topics in Algebra - I N Herstain, Wiley Eastern Ltd., New Delhi.
6. Modern Algebra - Sharma and Vashishta, Krishna Prakashan Mandir, Meerut, U.P.
7. Textbook of BSc Mathematics - Chakravarthy L.N., Vol 2, ISBN:1234567176245, Chethana Book House.

PRACTICAL - 5

Total: 30Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(2 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

LIST OF PROGRAMMES

1. Program to find the solution of the given total differential equation.
2. Program to find the solution of the given simultaneous differential equations.
3. Program to find the solution of the given partial differential equation.
4. Program to find whether given finite set is ring or not?
5. Program to show whether given subset of a finite ring is a subring or Not?
6. Program to find whether given subset of a finite ring is an ideal or not?
7. Program to find whether given function is a homomorphism or not?
8. Program to find whether given function is an isomorphism or not?
9. To plot periodic functions with period 2π and 2L
10. To find full range trigonometric Fourier series of some simple functions with period 2π and 2L.
11. Plotting of functions in half-range and including their even and odd extensions.
12. To find the half-range sine and cosine series of simple functions.
13. To find the half-range sine and cosine series of simple functions.

V SEMESTER

Paper - BSM 6: Line and Multiple Integrals and Laplace Transforms

Total: 60 Hrs

Line and Multiple Integrals: Definition of line integral and basic properties, examples on evaluation of line integrals. Definition of double integrals, evaluation of double integrals (1) under given limits (2) In regions bounded by given curves - change of variables, surface area as double integrals. Definition of triple integrals and evaluation, change of variables, volume as a triple integral.

02hrs/week=30hrs

Laplace Transforms: Definition and basic properties - Laplace transforms of e^{kt},$\cos kt$, $\sin kt$, t^n, $\cosh kt$ and $\sinh kt$ - Laplace transform of $e^{at}F(t)$, $t^n F(t)$, $F(t)/t$ - problems - Laplace transform of derivatives of functions - Laplace transforms of integrals of functions - Laplace

transforms of unit step functions - Inverse Laplace transforms - problems. Convolution theorem - Simple initial value problems - Solution of first and second order differential equations with constant coefficients by Laplace transform method.

02hrs/week=30hrs

Reference Books:

1. Integral Calculus - H.S. Dhami, New Age International Pvt. Ltd Publishers.
2. Text Book of Multiple Integrals - A.K. Sharma, Discovery Publishing House, New Delhi.
3. Differential and Integral Calculus, Vol. II - N. Piskunov, CBS Publishers & Distributors Pvt. Ltd.
4. Mathematical Analysis - S. C. Malik, Savita Arora, New Age Science Ltd.
5. Higher Engineering Mathematics - B.S. Grewal, Khanna publishers.
6. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley; Ninth edition, ISBN:8126531355
7. Schaum's Outline of Laplace Transforms - Murray Spiegel, McGraw-Hill Education
8. Laplace and Fourier Transforms - M. D. Raisinghania, New Delhi, India: S. Chand and Co. Ltd.

PRACTICAL - 6

Total: 30Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(2 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

LIST OF PROGRAMMES

1. Evaluation of the line integral with constant limits.
2. Evaluation of the double integral with constant limits.
3. Evaluation of the triple integral with constant limits.
4. Evaluation of the line integral with variable limits.
5. Evaluation of the double integral and triple integral with variable limits.
6. Evaluation of area of the surface as double integral.
7. Evaluation of volume of the solid as a triple integral.
8. Finding the Laplace transforms of some standard functions.
9. Finding the inverse Laplace transform of simple functions.
10. Program to Verify of Convolution Theorem.
11. Program to find the solution of a differential equation using Laplace transform method.

VI SEMESTER

Paper - BSM 7: Vector Space and Numerical Analysis

Total: 60 Hrs

Vector Space: Vector spaces, examples, subspaces, criterion for a subset to be a subspace. Concepts of linear dependence and independence. Fundamental theorem of linear dependence. Basis and dimension, standard properties of linearly independent and dependent sets examples, illustrations, concepts and results.

Linear transformations, Matrix representation of linear maps. Rank and nullity of a linear transformation.

02hrs/week=30hrs

Numerical Analysis: Solution of algebraic and transcendental equations of one variable by Bisection, Regula-Falsi and Newton-Raphson methods.

Finite differences (Forward and Backward differences) Interpolation, Newton's forward and backward interpolation formulae. Divided Differences-Newton's divided difference formula. Lagrange's interpolation formulae.

Numerical differentiation using Newton's forward and backward interpolation formulae.

Numerical Integration-Trapezoidal rule, Simpson's one-third and three - eight rule, Weddle's rule. (without proof).

Numerical solution of ordinary differential equations of first order and first degree-Picard's method, modified Euler's method, Runge-kutta method of fourth-order (No derivations of formulae).

02hrs/week=30hrs

Reference Books:

1. Herstain: Topics in Algebra, Wiley Eastern Ltd., New Delhi.
2. Modern Algebra - Sharma and Vashishta, Krishna Prakashan Mandir, Meerut, U.P.
3. Schaum's outline of Linear Algebra - Seymour Lipschutz, McGraw Hill Education.
4. The Linear Algebra a Beginning Graduate Student Ought to Know - Golan, Jonathan S, Springer International Publishing.
5. Introductory Methods of Numerical Analysis - S.S. Sastry, Prentice Hall India Learning Private Limited.
6. Numerical Methods: For Scientific and Engineering Computation - M.K. Jain, S.R.K. Iyengar, R.K. Jain, NEW AGE; 6th edition
7. Numerical Analysis - B. D Gupta, Stosius Inc/Advent Books Division.
8. Finite Difference and Numerical Analysis - H. C Saxena, S. Chand Publishing.
9. Numerical Methods for Scientists and Engineers - B. S. Grewal, Khanna Publishers.
10. Advanced Engineering Mathematics - E. Kreyszig.

PRACTICAL - 7

Total: 30Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(2 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

LIST OF PROGRAMMES

1. Program to verify given set is vector space or not?
2. Program to find whether given set is L.I or L.D.
3. Program to verify whether given function is basis or not?
4. Program to verify given mapping is Linear transformation or not?
5. Program to find matrix of a given linear transformation.
6. Program to find the rank and nullity of a linear transformation?
7. Scilab/Maxima programs on Interpolations with equal intervals.
8. Scilab/Maxima programs on Interpolations with unequal intervals.
9. Scilab/Maxima programs to evaluate integrals using trapezoidal, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$rule.
10. Solving ordinary differential equation by modified Euler's method.
11. Solving ordinary differential equation by Runge-Kutta method of 4^{th} order.

VI SEMESTER

Paper - BSM 8: Riemann Integration, Vector Calculus and Complex Analysis

Total: 60 Hrs

Riemann Integrations: Upper and Lower sums, Refinement of partitions, upper and lower integrals, integrability, Criterion for integrability, continuous and monotonic functions are Riemann integrable, integral as the limit of a sum, integrability of the sum and product of integrable functions, integrability of the modulus of an integrable function, the fundamental theorem of calculus.

Vector Calculus: Scalar field – gradient of a scalar field, geometrical meaning – directional derivative – Maximum directional derivative – Angle between two surfaces - vector field– divergence and curl of a vector field – solenoidal and irrotational fields – scalar and vector potentials – Laplacian of a scalar field – vector identities. Standard properties,
Harmonic functions, Problems.

2hrs/week=30hrs

Complex Analysis: Complex numbers, the complex plane - conjugate and modulus of a complex number - the modulus-argument form - geometric representation - Equation to circle and line in the complex form.

Functions of a complex variable, limit, continuity and differentiability of function- Analytic function - Cauchy-Riemann equations in Cartesian form. Sufficient conditions for analytic (in Cartesian form). Real and imaginary parts of analytic functions are harmonic, construction of analytic function given real or imaginary parts.

02hrs/week=30hrs

Reference Books:

1. Mathematical Analysis - S. C. Malik, Savita Arora, New Age Science Ltd.
2. Principles of Mathematical Analysis - Walter Rudin, McGraw-Hill Publishing Company.
3. Real and Complex Analysis - Walter Rudin, McGraw-Hill Higher Education.
4. Elements of Real Analysis - Shanti Narayan, S. Chand & Company, New Delhi.
5. Complex Variables and Applications - James Brown, Ruel Churchill, McGraw-Hill.
6. Foundations of Complex Analysis - S. Ponnusamy, Narosa book distributors Pvt. Ltd.-New Delhi
7. Schaum's Outline of Complex Variables - Murray Spiegel, John Schiller, Seymour Lipschutz, McGraw-Hill Education.
8. Complex Analysis - Lars Ahlfors, McGraw-Hill Education.
9. Vector Calculus - Paul C. Matthews, Springer-Verlag London.
10. Golden Vector Calculus, R. Gupta, Laxmi Publications
11. A Textbook of Engineering Mathematics - N. P. Bali, N. Ch. Narayana Iyengar, Laxmi Publications.
12. Textbook of Vector Calculus - Shanti Narayan, S. Chand.

PRACTICALS - 8

Total: 30Hrs

Practicals with Free and Open Source Software (FOSS) tools for computer programs
(2 hours/ week per batch)
Softwares used: 1. Maxima
2. Scilab

LIST OF PROGRAMMES

1. Programmes to find lower and upper Riemann sum.
2. Programmes to find lower and upper Riemann integration.
3. To demonstrate the physical interpretation of gradient, divergence and curl.
4. Writing gradient, divergence, curl and Laplacian in cylindrical coordinates.
5. Writing gradient, divergence, curl and Laplacian in spherical coordinates.
6. Using cyclic notations to derive different vector identities.
7. Using cyclic notations to derive some more vector identities.
8. Programs to verify given functions satisfy Cauchy-Riemann equations both in Cartesian and polar form.
9. Implementation of Milne-Thomson method in constructing analytic functions (simple examples).
10. Illustrating orthogonality of the surfaces obtained from the real and imaginary parts of an analytic function.
11. Program to verify given function is harmonic or not.
12. Program to verify real part of an analytic function being harmonic.
13. Program to verify imaginary part of an analytic function being harmonic.

PATTERN OF THE QUESTION PAPER

FROM 1st TO 6th SEMESTER

Time:3 Hours **Max.Marks:70**

I	Answer any FIVE of the following (8 questions are given)	$5 \times 2 = 10$ Marks
II	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
III	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
IV	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
V	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks

PATTERN OF THE QUESTION PAPER

PAPER -BSM 1

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1. 2. 3. } Matrices
4. 5. } Polar Co-ordinates
6. } Successive Differentiation
7. 8. } Function of two and three variables

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Matrices

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. } Matrices
4. 5. } Polar Co-ordinates

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. } Polar Co-ordinates
4. 5. } Successive Differentiation

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } Successive Differentiation
3. 4. 5. } Function of two and three variables

PAPER - BSM 2

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1. 2. } Groups
3. } Theory of plane Curves
4. 5. } Mean value theorems
6. } L'Hospital's rule
7. 8. } Integral Calculus

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Groups

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } Theory of plane Curves
3. 4. 5. } Mean value Theorems

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } Mean value Theorems
3. 4. 5. } L'Hospital's rule

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Integral Calculus

PAPER - BSM 3

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1.
2.
3. } Group Theory

4.
5.
6.
7.
8. } Ordinary Differential Equation

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Group Theory

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Ordinary Differential Equation (up to Exact)

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Ordinary Differential Equation (after Exact up to orthogonal trajectories)

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Ordinary Differential Equation (Higher order and simultaneous equations)

PAPER - BSM 4

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1.
2.
3.
4. } Ordinary Linear Differential Equations

5.
6.
7.
8. } Sequence and Series

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Ordinary Linear Differential Equations

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } Ordinary Linear Differential Equations
3. 4. 5. } Sequence of Real Numbers

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. } Sequence of Real Numbers
4. 5. } Infinite Series

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. } Infinite Series
4. 5. } The Integral testand Leibnitz's test

PAPER - BSM 5

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1. 2. } Total and Simultaneous Differential Equations
3. 4. } Partial Differential Equations
5. 6. } FourierSeries
7. 8. } Rings, Integral Domains and Fields

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. } Total and Simultaneous Differential Equations
5. } Partial Differential Equations

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. } Partial Differential Equations
4. 5. } FourierSeries

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } FourierSeries
3. 4. 5. } Rings (up to Subrings)

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Rings (From Ideals to till end)

PAPER - BSM 6

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1. 2. 3. 4. } Line and Multiple Integrals
5. 6. 7. 8. } Laplace Transforms

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } Line Integrals
3. 4. 5. } Double Integrals

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. } Double Integrals
3. 4. 5. } Triple Integrals

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Laplace Transforms

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Laplace Transforms

PAPER - BSM 7

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1.
2.
3.
4. } Vector Space

5.
6.
7.
8. } Numerical Analysis

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Vector Space (up to basis and dimensions)

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Vector Space (Linear transformation till end)

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Numerical Analysis (up to numerical differentiation)

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1.
2.
3.
4.
5. } Numerical Analysis (numerical integration till end)

PAPER - BSM 8

Time:3 Hours Max.Marks:70

NOTE: Answer All Questions

I. Answer any **FIVE** of the following: Marks: $5 \times 2 = 10$

1.
2. } Riemann Integrations

3.
4. } Vector Calculus

5.
6.
7.
8. } Complex Analysis

II. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Riemann Integrations

III. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Vector Calculus

IV. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Complex Analysis (up to analytic functions)

V. Answer any **THREE** of the following: Marks: $3 \times 5 = 15$

1. 2. 3. 4. 5. } Complex Analysis (from analytic functions till

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