| Sem No. | Paper Code | Title of the Paper | Hrs/ week | Marks | | IA | Total Marks | |
|---|---|---|---|---|---|---|---|---|
| | | | | Max | Min | | Max | Min |
| **Third Semester** | BCA 301 | Language - 1 | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 302 | Language – 2 | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 303 | Object Oriented Programming with C++ | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 304 | System Software | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 305 | Database Management | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 306 | C++ lab | **03** | 80 | 20 | 20 | 100 | 40 |
| | BCA 307 | SQL/PLSQL lab | **03** | 80 | 20 | 20 | 100 | 40 |
| **Fourth Semester** | BCA 401 | Language - 1 | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 402 | Language – 2 | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 403 | Java Programming | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 404 | Operations Research | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 405 | Computer Graphics | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 406 | Java Lab | **03** | 80 | 20 | 20 | 100 | 40 |
| | BCA 407 | Computer Graphics lab using C | **03** | 80 | 20 | 20 | 100 | 40 |

| Sem No. | Paper Code | Title of the Paper | Hrs/week | Marks | | IA | Total Marks | |
|---|---|---|---|---|---|---|---|---|
| | | | | Max | Min | | Max | Min |
| **Fifth Semester** | BCA 501 | Advance Java | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 502 | Software Engineering | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 503 | Operating System | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 504 | Data Communications | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 505 | Web Designing | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 506 | Advanced Java Lab | **03** | 80 | 20 | 20 | 100 | 40 |
| | BCA 507 | Web Designing lab | **03** | 80 | 20 | 20 | 100 | 40 |
| **Sixth Semester** | BCA 601 | Computer Networks | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 602 | Unix Operating System | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 603 | .NET Programming | **04** | 80 | 20 | 20 | 100 | 40 |
| | BCA 604 | Unix and .NET lab | **03** | 80 | 20 | 20 | 100 | 40 |
| | BCA 605 | Project Work | **03** | 80 | 20 | 20 | 100 | 40 |

## BCA 301 : LANGUAGE - I

The syllabus for this language is given by the BOS of corresponding language departments

## BCA 302 : LANGUAGE - II

The syllabus for this language is given by the BOS of corresponding language departments

## BCA 303: Object Oriented Programming with C++

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**UNIT 1:   Principles of OOPS:** 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.                                                      **6 Hrs**

**UNIT 2: Introduction to C++ Programming:** C++ features, Comparison with C, Structure of a C++ program, input and output statements, Keywords, symbolic constants, type compatibility, declaration of variables, reference variables, operators in C++, control structures.
                                                                                               **8 Hrs**

**UNIT 3: Classes Objects and Member Functions:** Limitations of structures in C, 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.                          **8 Hrs**

**UNIT 4: Constructors and Destructors:** Introduction, constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, dynamic initialization of objects, copy constructor, dynamic constructors, constructing two dimensional arrays, const objects, and destructors.                                              **6 Hrs**

**UNIT 5: Operator overloading and type conversions:** Introduction, definition, overloading unary operators, overloading binary operators, overloading operators using friends, string manipulations using operators, rules for operator overloading, type conversions.          **6 Hrs**

**UNIT 6: Inheritance:** Introduction, defining derived classes, single inheritance, making a private member inheritable, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, abstract classes, and constructors in derived classes, member classes, nesting of classes.                                         **8 Hrs**

**UNIT 7: Templates:** Introduction, class templates, class templates with multiple parameters, function templates, function templates with parameters.                            **6  Hrs**

**Reference Books:**
1. Object Oriented Programming with C++ - E balaguruswamy
2. C++ Prime – Stanly Lippaman and Jose Lajoie
3. Object Oriented Programming in Turbo C++ - Robert Lafore
4. C++ The complete Language – Bjarne Schildt
5. Object Oriented Programming with C++ - M.T Somashekara, D.S Guru, H.S Nagendraswamy, K.S Manjunatha

## QUESTION PAPER PATTERN

| | | | |
|---|---|---|---|
| **PART I** | **10 Marks** | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
| **PART II** | **20 Marks** | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1. 02 question from Unit 2. |
| **PART III** | **50 Marks** | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 02 question from Unit 3. 01 question from Unit 4. 01 question from Unit 5. 02 question from Unit 6. 01 question from Unit 7. |

## BCA 304:  SYSTEM SOFTWARE

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**UNIT 1: Machine Architecture and assemblers:** Introduction, System software and machine architecture, Simplified Instructional Computers (SIC) and its architecture, Instruction Formats of IBM-360**.**                                                                                                      **4 Hrs**

**UNIT 2:  Assembler**: 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 (detail flowchart).
**8 Hrs**

**UNIT 3: Table Processing : Searching & sorting -**  Linear and binary search , comparison, examples. Interchange sort,, shell sort, bucket sort, radix exchange sort, address calculation sort,. Random entry searching                                                                                                       **4 Hrs**

**UNIT4: Macro Language and macro processor:** Introduction, Macro instructions, Features of macro facility-macro instruction arguments, Conditional macro Expansion, Macro calls within macro, Macro instruction defining macro implementation: statement of problem, Specification of databases and specification of data base format, Algorithm and flowchart for processing macro definitions and Macro expansion                                                                       **10 Hrs**

**UNIT 5: Loader:** Introduction, Loader schemes-compile and go loader scheme, general loader, Absolute loader, Sub routine linkage, Relocating loader, Direct linking loader, overlays, Dynamic loading.                                                                                                       **10 Hrs**

**UNIT 6: Compiler:** Introduction, Statement of problem, Phases of compiler, Lexical phase, syntax phase, interpretation phase optimization phase, storage assignment phase, code generation phase, Assembly phase, passes of compiler.                                                                 **8Hrs**

**UNIT 7**: **Data Structures**: statement of problem, storage classes and its use.  Block structure.
**4 Hrs**

**References**:
1.  System programming – John. J. Donovan
2.  System Software – Leland L. Beck, Third edition, Addison Wesley 1997
3.  Systems programming and operating systems – Dhamdare

## QUESTION PAPER PATTERN

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| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3 02 question from Unit 4. 02 question from Unit 5. 01 question from Unit 6. 01 question from Unit 7 |

## BCA 305:  DATABASE MANAGEMENT SYSTEM

**Theory Examination – 80 Max Marks          Internal Assessment – 20 Max Marks**

**UNIT 1: 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, Encryption techniques.                                                      **8 Hrs.**

**UNIT 2: PL/SQL** Introduction to PL/SQL Concepts, PL/SQL Programming Fundamentals, data types SQL in PL/SQL, Conditional Control structure – if and case statements, Iterative Control structure, Error Handling and built in exceptions, Cursors, procedures, functions, Triggers.
**8 Hrs.**

**UNIT 3: Introduction:** Meaning of data and information, data processing, need for data, data processing and information.  Meaning of persistent data, definitions for DBMS, database, database system, examples, database system applications.  Meaning of file  and file management system, 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. Data mining and data ware housing(Definition, concept in brief)                                                                                                         **7 Hrs.**

**UNIT 4: E-R Model:** Using high-level, conceptual data models for database design, basic-concepts, 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), specialization, generalization, attribute inheritance, constraints on generalization, aggregation, the Unified Modeling Language (UML).                                         **6 Hrs.**

**UNIT 5: Relational Model:**  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.                             **6  Hrs.**

**UNIT 6: Relational Database Design:** 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.                                                                             **6 Hrs.**

**UNIT 7: Storage and File Structure** Overview of physical storage media, RAID, Organisation of records in files, Data dictionary, Ordered indicies, B+ tree index files, introduction to transactions.                                                                                    **7 Hrs.**

**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. J.D.Ullman "Principals of Data base systems" computer science press".
5. Bipin C Desai "Introduction to Data base system" Galgotia publications

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|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 02 question from Unit 1. 01 question from Unit 2. |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 02 question from Unit 3. 01 question from Unit 4. 01 question from Unit 5. 01 question from Unit 6 02 question from unit 7. |

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| **BCA 306: C++ LAB** |
|:---:|

**PRACTICAL EXAMINATION SCHEME**

Practical Proper - 70 Marks

Viva – voce -       10 Marks

| **Part –A** | One Program Max marks 25 | Program writing | 15 Marks |
|---|---|---|---|
| | | Error free compilation or partial output | 05 Marks |
| | | Correct result with proper display | 05 Marks |
| **Part - B** | One Program Max marks 45 | Program writing | 25 Marks |
| | | Error free compilation or partial output | 10 Marks |
| | | Correct result with proper display | 10 Marks |

**PART A**
1. Write a c++ program to accept the marks of three subject of a student and Calculate the result. The output should be in the following format.

---

Statement of Marks

---

Name:                                                                                    RegNo:

---

Combination:

---

                    Max/Min                                                    Marks obtained

Sub1

Sub2

Total:                                                                                                    Result:

2. Write a c++ program to define a **class** BankAccount including the following class members.

DataMembers:, cust name, accno,  balance.

Member Functions:  a) getdata(custname,accno,balance).

   b) display(accno).

   c) deposit(acno,amt).

   d) withdrow(accno,amt) updation aftern checking the balance.

   e) To display name & balance of all the records.

3. Write a c++ program to search the given element in a  group  using **function overloading**

4. Write  function using polymorphism to

Reverse an integer, reverse  a float ( 23.8 ➔ 8.23), to reverse a string

5. Let A be a class with member function to addmat(), B be a class with member function multimat(). Let readmat() and printmat()be two friend functions to both classes.  Using the above concept write a program to find the sum and product of two matrices. ( Take different matrices for addition and multiplication).

6. Write a c++ program to read an integer number and find the sum of all digits until it reduces to a single digit using **constructor** and **default constructor**

7. Write a c++ program to create a class complex and perform the following operations using **friend function**

        Addition of two complex numbers

        Multiplication of two complex numbers

8. Define a class P to calculate the remainder and class Q to calculate quotient.  Inherit the class P and Q to reverse the given integer and check for polyndrome.

**PART – B**

9. Write a c++ program to define a class STACK using an array of integers and to implement the following operations by overloading the operators + and –
    i.   S1=s1+ele ; where s1 is an object of the class STACK and ele is an integer to be pushed on to top of the stack
    ii.  S1=s1-; where s1 is an object of the class STACK and operator pops the top element.
         Handle the STACK Empty and Full conditions.  Also display the contents of the stack after each operation, by overloading the operator <<.

10. **Wri**te a c++ program to create a class string where S1,S2 & S3 are objects, Initialize the objects S1 & S2 using **parameterized constructor** and do the following operations using **operator overloading**

    Concatenate S1 & S2 object using "**+**" operator and assign the result to S3 object

    Concatenate   S1 & S2 object  using "**==**" use friend operator function

    Compare two strings S1 & S2 with respect to length using"**<=**" operator

11. Write a c++ program to calculate age of a person by **passing object as arguments**. Create two objects O1 and O2. O1 reads the current date in the format of DD/MM/YYYY and O2 reads the date of birth in the same format

12. Write a c++ program to transform the amount from one account to another account using **objects as  function arguments**.

13. Write a c++ program to store the following information in base class with members Ename,Ecode,Design and the Derived class with data members year of experience , age. Construct an object oriented database to carry out the following using **single inheritance**

>    Input records
>    Display records
>    Delete record
>    Sort the records by employee name

14. Write a c++ program to store the following information in base class (name of patient, age, sex). Another base class consists of (ward number, bed number, nature of illness). The derived class consists of (date of admission). Construct an object oriented database to carry out the following using **multiple inheritance**

>    Input records
>    Display records
>    Delete particular patient record
>    Sort records by patient name

15. Write a c++ program to implement **multilevel inheritance**
    a. College—> name_id, location,dept
    b. Student—>name ,reg_no, course,age
    c. DOB—>date, month, year, place

16. Write a **function template** to search an element in an array.

17. Write a **function template** to sort N numbers in ascending/descending order.

18. Write a **class template** to implement linked implementation of queue for operations Qinsert, Qdelete, Qempty, Qfull.

19. Write a class template to represent a generic vector( a series of values). Include member functions to perform the following tasks.
    i.      To create a vector
    ii.     To modify the value of given element
    iii.    To multiply by a scalar value.
    iv.     To display vecot in the form (10,20,30,…)

## BCA 307: SQL - PL/SQL LAB

**PRACTICAL EXAMINATION  SCHEME**

Practical Proper - 70 Marks
Viva – voce -      10 Marks

| | | | |
|---|---|---|---|
| **Part –A** | Table Creation SQL queries | Table creation & data insertion | 10 marks |
| | | 4 SQL queries | 20 marks |
| | | Queries writing 3 marks (each) | |
| | | Execution 2 marks (each) | |
| **Part - B** | Two PL/SQL programs | Program writing (10*2) | 20 Marks |
| | | Execution & result (10*2) | 20 marks |

I. Use the default emp and dept talbe to write SQL statements for the following queries
   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
   10. Display the eno, name manager name and department name in the order of their department

PL/SQL problems
   1. Write pl/sql code block to accept a number and reverse it
   2. Write pl/sql code block to accept the name, marks in 4 subjects of a student and find total average and result.
   3. Assume a table number with columns num, reverse. Data is present only in the column num. Write pl/sql code block to update the number table using cursor. The code should calculate the reverse of the num, check whether num is prime or not, a member of Fibonacci series or not. Use Functions to do these jobs.
   4. Create a row trigger to keep running count of DML operations performed by different users on the emp table.
   5. Assume two tables item_masert(ino,qty_inhand) and transaction(ino,qty,tr_type). Write pl/sql code block to update qty_inhand in the item_master table using the records in the transaction table. The qty_inhand must be decreased by the qty in transaction table if tr_type is 'Sales' and has to be increased by qty if tr_type is 'purchase'. Updation depends on ino. If an ino is not found in the item_master then insert a new item into the item_master table. Use function to check the presence of ino in maseter table.

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 semester 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 the 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)
10. Find the year in which highest and lowest students have admitted to the college.

**PL/SQL problems**

1. Write PL/SQL code block to calculate the result of studetns using cursor
2. Create a trigger which has to be fired whenever any modification is done to the markscard table. Store the modification in the back up table.
3. Write PL/SQL function to count the number of students in a sem of a course.
4. Write pL/SQL procedure to retrieve the total, avge and result of a student given his regno, course and sem

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

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 the number of employees having atleast 10 years of experience in every department.
9. Count  the number of employees who are not getting commission in every department
10. Create a new table manager using above tables containing columns dname,name,net.

**PL/SQL problems**

1. Write PL/SQL program to compute DA,HRA,… using cursor
2. Write  PL/SQL function to accept eno and return his net salary if eno is valid otherwise raise exception 'no data found'
3. Write PL/SQL procedure to extract the details of an employee given his eno. Display appropriate message for wrong eno
4. The HRD manager has decided to raise the salary of all employees in the department number 20 by 0.05%.  Whenever such raise is given to the employees, a record for the same is maintained in the emp_raise table.  This table has the columns eno,the date of raise and raised amount.Write PL/SQL code block to achieve the above.
5. Write a statement  trigger on emp table such that the insertion is possible only on Thursday.

IV. Create tables as below

Employee(eno, ename,street,city)
Company(cno,cname,city)
Works(eno,cno,sal)
Manages(mno,eno)

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'
10. Rollback the deleted information only (using savepoint)

PL/SQL problems
1. Write pl/sql program to display ename,city,cname,city,sal,manager name of every employee , company wise using cursor
2. Write pl/sql procedure to display the employee details of the company 'c1' who draw salary greater than 50000 per month
3. Write PL/SQL function to test the validity of an employee number. If it is valid display his details (personal and professional). Otherwise display appropriate message
4. Create a trigger which keeps track of any changes done to the company and works table. Record the changes (old and new) in a backup table.

## BCA 401 : LANGUAGE - I

The syllabus for this language is given by the BOS of corresponding language departments

## BCA 402 : LANGUAGE - II

The syllabus for this language is given by the BOS of corresponding language departments

## BCA 403: JAVA PROGRAMMING

**Theory Examination – 80 Max Marks          Internal Assessment – 20 Max Marks**

**UNIT 1: Introduction to Java and Java Program Structure:** History of Java, Java features, Difference between C/C++ and Java, Java program structure, Java tokens, Statements, JVM, Introduction to packages in Java, Applets, Operators & Expressions, Data types, Constants and Variables, Type conversions, Mathematical functions.                    **8 Hrs**

**UNIT 2: Control Statements**: Decision making and Branching with while, do-while, for and labeled loops; **Arrays, Vectors & Strings**: Initialization, Declaration of 1D, 2D arrays, String arrays, String methods, Vectors, Wrapper classes.                    **6 Hrs**

**UNIT3: Overview**: Class, Objects, Constructor, Method overloading, Static members; **Inheritance**: Single, Multilevel, Hierarchical, Visibility modes, Method overriding, Final variable, Abstract methods and classes;

**6 Hrs**

**UNIT 4: Interface**: Defining, Extending and Implementing assigning interface variables
                                        **4 Hrs.**

**UNIT 5: Packages and multithreading:** 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.                    **8 Hrs.**

**UNIT 6: Exceptions and Debugging:** 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).                    **6 Hrs.**

**UNIT 7: Applets and Graphics**: 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. Using control loops in applets, drawing bar charts. **:**                    **10 Hrs.**

<u>**Reference Books:**</u>
1. Java, The Complete Reference     –   Patrick Naughton and Schildt
2. Programming in Java               –   Joseph L Weber
3. Java Programming                  –   E Balagurusamy

## QUESTION PAPER PATTERN

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|---|---|---|---|
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| PART III | 50 Marks | There shall be 07 question and each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3. 01 question from Unit 4. 02 question from Unit 5 01 question from Unit 6. 02 question from Unit 7 |

## BCA 404: OPERATIONS RESEARCH

**Theory Examination – 80 Max Marks        Internal Assessment – 20 Max Marks**

**UNIT 1: Operations research:** Nature and meaning, models characteristics, advantatges. General methods for solving O.R. models - analytical, numeric and Monte Carlo. Advantages and scope.                                                                 **4 Hrs.**

**UNIT 2: 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.      **8 Hrs**

**UNIT 3: Simplex Method**: Simplex method, algorithm and flowchart for maximization type problem. Big-M method for solving LPP.                                               **10 Hrs**

**UNIT 4: Transportation Problem.:** Formulation, Necessary and sufficient condition for the existence of feasible solution to a T.P. IBFS by NWCR, LCM and VAM. Optimal solution using U-V method. Algorithm and flow-chart for minimization T.P                      **8 Hrs.**

**UNIT 5: Assignment Problem.:** Formulation, optimal solution using Hungarian algorithm, traveling salesman problem.                                                        **6 Hrs**

**UNIT 6: 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.                                         **6 Hrs.**

**UNIT 7: Network analysis:** Network and basic components, Rules for network construction, basic steps in PERT/CPM techniques and applications. Time estimates and critical path in network analysis.                                                              **6 Hrs.**

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

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## BCA 405: COMPUTER GRAPHICS

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**UNIT 1: Multimedia** :  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.                    **4 Hrs.**

**UNIT 2: 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 video standards.           **8Hrs**

**UNIT 3: Introduction :** Graphics applications – CAD , presentation graphics, computer art, entertainment,  education and training, visualisation, image processing. Display devices – raster scan displays – color CRT, DVST, LCD, 3D viewing devices. Raster scan systems, Random scan systems. List of  I/O devices.                    **5 Hrs**

**UNIT 4: Output primitives –** 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, ellipse generating algorithm. Pixel addressing and object geometry.  Color and gray scale levels, color tables, character attributes**.      10 Hrs**

**UNIT 5: 2D Transformation -** Basic Transformations- translation,. Scaling, rotation, matrix representation and homogeneous coordinates, composite transformations- translation, scaling, general pivot point and fixed point rotation, scaling directions, other transformations – reflection, shear, transformation between coordinates, inverse transformations.           **10 Hrs**

**UNIT 6: Windowing and Clipping**-Introduction, the viewing transformation, viewing transformation implementation, clipping, the Cohen-Sutherland outcode algorithm, Liang-Barsky line clipping algorithm, the Sutherland-Hodgeman algorithm, the clipping of polygons and adding clipping to the system, text clipping, exterior clipping, curve clipping.       **6 Hrs**

**UNIT 7: Three Dimensional Concepts**: Introduction, Three dimensional geometry, three dimensional primitives and transformations. Rotation about an arbitrary axis.   Fractal- geometry – fractal genetation procedures, classification, fractal dimension**,**construction of self similar fractals                    **5 Hrs**

**REFERENCES :**
1. Tay Vaughan "Multimedia – making it work", TMH publication, fifth edition.
2. D Hearn & M P Baker: "Computer Graphics C version", Pearson Education
3. D Newman and Sproull: "Principles of Interactive Computer Graphics -, TMH, second edition.
4. Steven Harrington "Computer graphics: A programming Approach", TMH publication. Second edition
5. Roy plastock and Zhigang Xiang: " Computer graphics". Schaum's outline series, II edition.
6. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications and Applications", Pearson, 2001

## QUESTION PAPER PATTERN

| | | | |
|---|---|---|---|
| **PART I** | **10 Marks** | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
| **PART II** | **20 Marks** | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1.<br>02 question from Unit 2 |
| **PART III** | **50 Marks** | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3.<br>02 question from Unit 4.<br>02 question from Unit 5.<br>01 question from unit 6<br>01 question from unit 7 |

## BCA 406: JAVA Programming Lab

**PRACTICAL EXAMINATION SCHEME**

Practical Proper - 70 Marks

Viva – voce -     10 Marks

| Part –A | One Program Max marks 25 | Program writing | 15 Marks |
|---|---|---|---|
| | | Error free compilation or partial output | 05 Marks |
| | | Correct result with proper display | 05 Marks |
| Part - B | One Program Max marks 45 | Program writing | 25 Marks |
| | | Error free compilation or partial output | 10 Marks |
| | | Correct result with proper display | 10 Marks |

## PART A

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 encode the given set of characters using simple encryption.
3. 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.

4. Write a Java program using function over loading to find biggest among two, three and 'N' numbers.
5. Write a java program to find area of geometric figures (atleast 3) using method overloading.
6. Write a Java program to find the circumference and area of the circle using interface.
7. Write a java program to sort the alphabets in the given string.
8. Write a java program to perform matrix addition and multiplication using case statement
9. Write a java program to accept student information using array of objects and constructor initialisation.
10. Write a java program to accept student, employee information to perform relevant computation using hierarchical inheritance.

## PART B

11. Write a java program to implement static and dynamic stack using interface using abstract class.
12. Define an interface with methods to add and subtract two floating point numbers each of which returns a floating point number. Declare a class Customer, implementing the above interface by providing definitions for the abstract methods (*addition* and *subtraction*) of the interface to perform the deposit and withdrawal operations respectively. Similarly declare one more class Bank Staff implementing the above interface by providing definitions for the abstract methods of the interface to perform the salary hike and salary deduction operations.
13. Write a Java program with a class Person having instance variables to store person name, date of birth, city, phone and methods to read and display the instance variables. Declare one more class Student with instance variables to store register number, course, combination, semester, marks obtained in five subjects, total marks, percentage marks, grade and methods to accept and display student details, to calculate total and percentage marks and to evaluate grade. Also, class Student extends class Person. Evaluate the grade based on the following criteria.

    If Percentage Marks is 70 and above, Grade will be Distinction.
    If Percentage Marks is 60 and above but below 70, Grade will be First Class.
    If Percentage Marks is 50 and above but below 60, Grade will be Second Class.
    If Percentage Marks is 40 and above but below 50, Grade will be Pass.

    The above criteria should be applied only when the marks obtained in each of the subjects is 40 or more.

    Also, display the marks sheet of the student as shown below:

    Kuvempu University
    MARKS SHEET

Name of the Student:                                    Register Number  :
Course                    :                             Semester          :
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

| SUBJECTS | MAX. MARKS | MIN. MARKS | MARKS OBTAINED |
|----------|------------|------------|----------------|
| 1. K/S/H/U | 100 | 40 | - - - |
| 2. English | 100 | 40 | - - - |
| 3. Java Programming | 100 | 40 | - - - |
| 4. Operations Research | 100 | 40 | - - - |
| 5. Computer Graphics | 100 | 40 | - - - |

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Total Marks        :        500              200              - - -
   Percentage Marks  :        - - -
   Grade              :        - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

14. Write a java program to implement constructor overloading by passing different number of parameter of different types.
15. Write a java program to accept employee information to calculate T.A, D.A, HRA, gross salary, and net information using overriding.
16. . Define a package to contain the class sort to contain  methods for various sorting techniques with time complexity (at least 3)Use this package to sort the list
17. Write a Java program to add two time values.  Verify whether the operand time values and result time are valid or not.  If operand times are valid, add the two given time values.  If invalid, throw a user defined exception saying that time value is not valid.  Also, adjust the invalid time value so that it becomes valid.
18. Write a Java program to generate odd, even and Fibonacci numbers simultaneously using the concept of multi-threading.
19. Write a program to demonstrate priority threads.
20. Write a program to demonstrate how to overcome from producer and consumer problem.
21. Write a program to implement an applet by passing parameter to HTML
22. Write an applet program to display human face
23. Write a program to create student report using applet, read the input using text boxes and display the output using button.
24. Create an applet to display concentric  n circles, input value for n.
25. Design an applet for simple calculator for 4 arithmetic operations.


## BCA 407: Computer Graphics Lab

### PRACTICAL EXAMINATION SCHEME
Practical Proper - 70 Marks
Viva – voce -       10 Marks

| Part –A | One Program Max marks 25 | Program writing | 15 Marks |
|---------|--------------------------|-----------------|----------|
|         |                          | Error free compilation or partial output | 05 Marks |
|         |                          | Correct result with proper display | 05 Marks |
| Part - B | One Program Max marks 45 | Program writing | 25 Marks |
|         |                          | Error free compilation or partial output | 10 Marks |
|         |                          | Correct result with proper display | 10 Marks |

## PART A

1. Write a program to draw borders at the four corners of the screen.
2. Program for DDA line drawing algorithm
3. Bresenham's line drawing algorithm
4. Bresenham's line drawing algorithm for |m|<1
5. Parallel line algorithm
6. Mid point circle algorithm
7. Ellipse generating algorithm'
8. To draw a line graph for monthly sales data

## PART B

9. Program to continuously rotate an object about origin. Small angles to be used for successive rotation.
10. Write a program that applies any specifies sequence of transformations to a displayed object. The program is to be designed so that a user selects the transformation sequence and associated parameter from displayed menus, and the composite transformation is then calculated and used to transform the object. Display the original and transformed objects in different colours or different fill patterns.
11. Program to demonstrate clipping by defining world and viewing coordinates
12. Implement Cohen Sutherland line clipping algorithm
13. Implement Liang-Barsky line clipping algorithm
14. Implement S'utherland - Hodgeman polygon clipping algorithm
15. Implement snowflake fractal for a given number of iterations (optional)

## V SEMESTER
## BCA 501: ADVANCED PROGRAMMING IN JAVA

**Theory Examination – 80 Max Marks**        **Internal Assessment – 20 Max Marks**

**UNIT 1: Revision of OOPS and Java Concepts:** Class, Object, Inheritance, Polymorphism, Packages, Exception Handling, Multithreading applets and related concepts of Java programming language.                                                                            **4 Hrs.**

**UNIT 2:   AWT, Graphics Programming:** AWT and AWT Classes, Window fundamentals – Component, Container, Panel, Window, Frame, Canvas. Working with frame window.
**Graphics Programming:** Graphics class, methods, drawing objects, line graphs, polygon classes, working with colors and fonts.  Advanced graphics operations using Java2D.  Designing simple User Interfaces (UIs) using AWT, Layout Manages.                                **10 Hrs**

**UNIT 3: Event Handling:** Basics of Event Handling, the delegation event model, AWT event hierarchy and event classes, Event Listener Interfaces, Adapter Classes, Event queue.    **5 Hrs**

**UNIT 4: Swing:** Meaning, need difference between AWT and swing. The Model-View-Controller (MVC) design patterns, Creating simple UIs using swing, and handling basic events.
                                                                                                                      **5 Hrs.**

**UNIT 5: Java Beans and Java Archives (JAR):** Meaning and need of Java Beans, Advantages, Bean writing process, Bean properties. **Java Archives (JARs):**  Meaning, need, the JAR utility, Creating JAR files.                                                                                    **6 Hrs.**

**UNIT 6: File Management and JDBC:**  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, PreparedStatement object, CallableStatement, ResultSet, JDBC Exceptions.                                                        **8 Hrs.**

**UNIT 7: Fundamental concepts of Collections, Generics and Network programming:**
**Collections:** Meaning, need, Collection interfaces, Concrete Collections – ArrayList, Hashset, 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 the constructors, implementing generic methods. **Network programming:**  Meaning of Client, Server, Socket, port.  Creating a client socket, creating a server socket, writing simple server and client.
                                                                                                                      **10 Hrs.**

**References:**
1. The 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, Pearson Education Asia.

## QUESTION PAPER PATTERN

| PART I | 10 Marks | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1.<br>02 question from Unit 2 |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3.<br>01 question from Unit 4.<br>01 question from Unit 5.<br>02 question from Unit 6.<br>02 question from unit 7 |

## BCA 502: SOFTWARE ENGINEERING

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**UNIT 1: INTRODUCTION:**   Definition of software, software engineering challengers software engineering approach                                                               **6   hrs**
**UNIT 2: SOFTWARE PROCESS:** Introduction to software process characteristics of software process software process models                                                        **8 hrs**
**UNIT 3: SOFTWARE PLANNING:** Introduction to planning, effort estimation, project scheduling and staffing risk management project monitoring plan                          **6 hrs**
**UNIT 4: ANALYSIS:** Software requirements, problem analysis, requirement specification: characteristics of SRS, components of SRS, specification language, structure of requirement document, validation.                                                                                **8 hrs**
**UNIT 5: DESIGN**: **Function oriented design**: design principles, module level concept, structure design methodology **Object oriented design**: design principles, structure design methodology                                                                                          **10 hrs**
**UNIT 6: CODING:**   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).                                       **6 hrs**
**UNIT7: TESTING**: testing fundamentals, black box and white box testing, comparison between black box and white box testing, testing process (levels of testing, test plan).
                                                                                        **6 hrs**

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

| PART I | 10 Marks | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1.<br>02 question from Unit 2 |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3.<br>02 question from Unit 4.<br>02 question from Unit 5.<br>01 question from Unit 6.<br>01 question from unit 7. |

## BCA 503: DATA COMMUNICATION

**Theory Examination – 80 Max Marks          Internal Assessment – 20 Max Marks**

**UNIT 1: INTRODUCTION**: Communication model & Data Communication networking - types. Data Transmission- Transmission terminology, Analog & Digital data transmission, Transmission impairments – attenuation, delay distortion & noise.                    **6 Hrs**

**UNIT 2: DATA TRANSMISSION MEDIA**: 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.                    **8 Hrs**

**UNIT 3: DATA ENCODING**: 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.                    **10  Hrs**

**UNIT 4: DATA LINK CONTROL :** 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                    **8 Hrs**

**UNIT 5: MEDIUM ACCESS SUB LAYER:** the channel allocation problem. Multiple access Protocol-ALOHA, carriers sense multiple access protocol, collision free protocol.                    **5 Hrs**

**UNIT 6: MULTIPLEXING :** Frequency division multiplexing- characterstics, anlog carrier systems, Time division multiplexing- characterstics, link control. Digital carrier system, ISDN user network interface.                    **5Hrs**

**UNIT7: SWITCHING:** 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                    **6 Hrs**

**Reference books:**
1. Data and Computer Communications – William Stallings.
2. Computer Networks – Andrew S. Tanenbaum.
3. Data Communication – Ulysis D Black.
4. Data Communication and Networking – Behrouz A. Forouzan.
5. Internetworking with TCP/ IP – Douglas E comer, PHI

## QUESTION PAPER PATTERN

| PART I | 10 Marks | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1.<br>02 question from Unit 2. |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 02 question from Unit 3.<br>02 question from Unit 4.<br>01 question from Unit 5.<br>01 question from Unit 6.<br>01 question from Unit 7. |

## BCA 504: OPERATING SYSTEM

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**UNIT 1: Introduction:** Definition of Operating System, need. Early systems – Simple monitors, Batch Systems. Multiprogramming, Time Sharing, Real time, 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.                                                    **04 Hrs**

**UNIT 2: Operating System Structure:** Services, User-Operating System Interface, Components, Structure – simple and layered. System calls and its types, System programs, Virtual machines and its benefits.                                              **06 Hrs**

**UNIT 3: Process Management:** 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          **06 Hrs**

**UNIT 4: 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, multi-level feedback queue scheduling. Multiple processor scheduling, Real time scheduling.          **06 Hrs**

**UNIT 5: Deadlocks:** System model, Dead lock characterization – Necessary Conditions, Resource Allocation Graph, Dead lock prevention, Avoidance and detection, Recovery from dead lock.                                                                  **06 Hrs**

**UNIT 6: Memory Management:** Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Virtual memory - demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing.                     **10 Hrs**

**UNIT 7: Secondary Storage Structure and Disk Management:** Disk structure & scheduling methods, Disk management, disk reliability. **File Management:** File concepts, Access methods, Directory structure, Protection and consistency semantics, File system structure, Allocation methods, free space management, Directory implementation, Efficiency and performance, Recovery.                                                                 **10Hrs**

**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, Pearson Edition.
4. Tanenbaum, Operating System Concepts, Pearson Education
5. Nutt : Operating System, 3/e Pearson Education 2004

## QUESTION PAPER PATTERN

| | | | |
|---|---|---|---|
| **PART I** | **10 Marks** | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
| **PART II** | **20 Marks** | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 02 question from Unit 1. <br> 01 question from Unit 2 |
| **PART III** | **50 Marks** | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3. <br> 01 question from Unit 4. <br> 01question from Unit 5. <br> 02 question from Unit 6. <br> 02 question from unit 7 |

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## BCA 505: WEB PROGRAMMING: JEE TECHNOLOGY CONCEPTS AND JSP

**Theory Examination – 80 Max Marks          Internal Assessment – 20 Max Marks**

**UNIT 1:  Client – Server Systems**: Meaning of client and server, Client-Server architecture, benefits, concept of ports and sockets.    Protocol – Meaning, definition, examples, meaning of stateless and state (stateful) protocols.  HTTP protocol – meaning, http protocol request and response header formats, status codes. Client-Server communication scenario.          **06 Hrs**

**UNIT 2: JEE Technology Concepts:** Multi-tier architecture for application development – Meaning, need, advantages.  Meaning of enterprise application and web application, challenges of Enterprise application development, 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.  Comparison between traditional approach for application development and JEE.          **08 Hrs**

**UNIT 3: Enterprise Java Bean:** Meaning and use of Java beans and EJBs, meaning of business logic, Common requirements of business objects.  Types of EJBs – Entity Bean – Meaning and Guidelines for using entity beans, Session beans – types of session beans – stateful, stateless – uses of stateful and stateless session beans, Message Driven Beans.          **08 Hrs**

**UNIT 4: Dynamic Content:** Meaning of dynamic content and static content, history of dynamic content generation in web pages. Definition and brief discussion on scripting, need for scripting languages.          **06 Hrs**

**UNIT 5 : HTML**: File creation , web server, web client, Browser, HTML tags, paired tags, commonly used commands, titles and footers, text styles, other text effects Lists, adding graphics to HTML documents, Tables, Linking documents, frames.          **04 Hrs**

**UNIT 6: Java Scripts:** Meaning, need, Advantages, Details of the language – Java Script Syntax, Using the <SCRIPT> tag.  Comments. Data types and variables, Operators, Loops and conditionals, functions. **08 Hrs**

**UNIT 7: Java Server Pages Programming Concepts:** 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. **10 Hrs**

**Reference Books:**
1. The Complete Reference – J2EE – Jim Keogh
2. J2EE – Kevin Mukhar, James L. Weaver, James P Crume, Ron Phillips

## QUESTION PAPER PATTERN

| | | | |
|---|---|---|---|
| **PART I** | **10 Marks** | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
| **PART II** | **20 Marks** | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1.  02 question from Unit 2 |
| **PART III** | **50 Marks** | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 02 question from Unit 3.  01 question from Unit 4.  01question from Unit 5.  01 question from Unit 6.  02 question from unit 7 |

## BCA 506: Advanced Programming in Java

### PRACTICAL EXAMINATION SCHEME

Practical Proper - 70 Marks

Viva – voce -        10 Marks

| Part –A | One Program Max marks 25 | Program writing | 15 Marks |
|---|---|---|---|
| | | Error free compilation or partial output | 05 Marks |
| | | Correct result with proper display | 05 Marks |
| Part - B | One Program Max marks 45 | Program writing | 25 Marks |
| | | Error free compilation or partial output | 10 Marks |
| | | Correct result with proper display | 10 Marks |

## Part A

1. Write an Applet program to design a user interface to key-in the details of an employee.
2.  Write an applet to add, remove, select an item in a list
3. Write a applet display select geometric figure from a list.
4. Write a program to implement mouse events
5. Write a program to implement keyboard events
6. Write a Java program (console) to store the typed text to a file.

7. Write a Java program to display the content of a file.
8. Write a Java program to edit the content of a file.
9. Write a Java program to design a user interface using awt or swing APIs with event handling (don't use applet). The program should read, through the text boxes, the details of the student like student name, Register number, Course, Semester, and marks obtained in 5 subjects (assume that the number of subjects for all the defined courses and semesters will be same). For Course and semester, design the combo box. Design three buttons. First, to calculate the total marks, percentage marks and grade. Second, to clear the fields and the third, to exit. Assume the suitable criteria to evaluate the grade. Also design text boxes to display the total marks, percentage and grade. Use appropriate layout manager to arrange the user interface controls.

## PART B

10. Write a Java program with JDBC to store the details of a person on to an Oracle database table.
11. Write a Java program with JDBC to access and display the details of a person stored in an Oracle database table.
12. Write a Java program with JDBC to access and delete the details of a given person stored in an Oracle database table.
13. Write a Java GUI program to accept the details of an employee and store the same on to an Oracle database table.
14. Write a Java GUI program to access and display the details of a given employee stored in Oracle database table.
15. Write a Java program to design a simple Client and Server components. Pass simple text (static) from client to the server and a receipt acknowledgement (static) back to the client.
16. Write a Java program to design a Client and Server components. Pass the text from client console to the server and a receipt acknowledgement (static) back to the client.
17. Write a Java program to design a login session through Client and Server components. From client, pass the username and password to the server, verify the username and password combinations at the server and if there is a match, send a success message, otherwise a failure message back to the client.
18. Write a Java program to demonstrate the use of generics.

## BCA 507: Web Programming Lab

### PRACTICAL EXAMINATION SCHEME

Practical Proper - 70 Marks
Viva – voce -      10 Marks

| Part –A | One Program Max marks 25 | Program writing | 15 Marks |
|---------|--------------------------|-----------------|----------|
|         |                          | Error free compilation or partial output | 05 Marks |
|         |                          | Correct result with proper display | 05 Marks |
| Part - B | One Program Max marks 45 | Program writing | 25 Marks |
|          |                          | Error free compilation or partial output | 10 Marks |
|          |                          | Correct result with proper display | 10 Marks |

1. Write a JSP application to find the biggest among 2, 3, and n numbers using method overloading.
2. Write a JSP application to sort list of names. Read the key for the search through the user interface.
3. Write a multilayered JSP application to search the given name using binary search.
4. Write a multilayered JSP application to search the given name using linear search.
5. Write a multilayered JSP application to search the given name using recursive binary search
6. Write a JSP program to find the biggest among given n numbers. Initialize n elements to an array statically. Display the output properly.
7. Write a multilayered JSP program to find the biggest among three numbers. Accept any three numbers by designing a suitable user interface page. Evaluate biggest among them by writing a correct JSP process page.
8. Write a JSP program to evaluate the result of a student. Consider student name, register number, marks obtained in 5 subjects as static inputs. Calculate total marks, percentage marks and evaluate the grade. While evaluating the grade verify whether the student has cleared all the papers. Display the output properly by using  .
9. Write a JSP application to evaluate the salary details of an employee. Consider employee name, designation, department, basic salary, TA, DA, HRA, PF and LIC (in percentage) are inputs and initialize them statically. Calculate allowance, deduction, gross salary and net salary. Display the output in proper format.
10. Write a multilayered JSP application to evaluate and handle the functionalities of a shop. Consider item number, name, type, unit price, quantity as input. Calculate the amount customer has to pay. Also consider that for some type of item there will be some percentage discount. Based on the type of item calculate the discount amount deduct from the amount that the customer has to pay.

**Part B**

11. Write a JSP application to read the details of a student and store the same on to the database.
12. Write a JSP application to evaluate the result of a student and populate the MS Access table with the values
13. Write a JSP application to generate the mark sheet of a given student, by retrieving the details stored in the MS Access database.
14. Write a JSP application to generate the mark sheet of all the students, by retrieving the details stored in the MS Access database.
15. Write a JSP application to evaluate the salary details of an employee and store the same in the MS Access database table.
16. Write a JSP application to generate the salary bill of a given employee by retrieving the details stored in the MS Access database table.

17. Write a JSP program to evaluate the result of a student. Consider student name, register number, marks obtained in 5 subjects as static inputs. Calculate total marks, percentage marks and evaluate the grade. Display the output properly by using <TABLE> tag.
18. Write a multilayered JSP program to evaluate the result of a student. Consider student name, register number, marks obtained in 5 subjects as input and read them by writing a proper user interface JSP. Evaluate the total marks, percentage marks and grade by writing a process JSP. While evaluating the grade verify whether the student has

cleared all the papers.  Display the output with proper marks list format by using   as shown below.

<div align="center"><i>College Name</i><br>Marks List</div>

Name of the Student:

Register Number:

| Subjects | Max. Marks | Min. Marks | Marks Obtained |
|---|---|---|---|
| 1.  Subject1 | 100 | 40 | -- |
| 2.  Subject2 | 100 | 40 | -- |
| 3.  Subject3 | 100 | 40 | -- |
| 4.  Subject4 | 100 | 40 | -- |
| 5.  Subject5 | 100 | 40 | -- |
| Total Marks | 500 | 200 | -- |
| Percentage Marks | -- % | | |
| Grade    ---- | | | |

19. Write a multilayered JSP program to evaluate the result of a student.  Consider student name, register number, marks obtained in 5 subjects as input and read them by writing a proper user interface JSP.  Evaluate the total marks, percentage marks and grade by writing a process JSP.  While evaluating the grade verify whether the student has cleared all the papers.  Display the output with proper marks list format by using <TABLE> tag.

<div align="center"><b>College Name</b><br>Marks List</div>

Name of the Student                                                    :

Register Number    :

| Subjects | Max. Marks | Min. Marks | Marks Obtained |
|---|---|---|---|
| 1.  Subject1 | 100 | 40 | -- |
| 2.  Subject2 | 100 | 40 | -- |
| 3.  Subject3 | 100 | 40 | -- |
| 4.  Subject4 | 100 | 40 | -- |
| 5.  Subject5 | 100 | 40 | -- |
| Total Marks | 500 | 200 | -- |
| Percentage Marks: | -- % | | |
| Grade: | ---- | | |

20. Write a multilayered JSP application to evaluate the salary details of an employee.  Read employee name, designation, department, basic salary, TA, DA, HRA, PF and LIC (in percentage) through a proper user interface page.  Calculate allowance, deduction, gross salary and net salary.  Display the output in proper format by using <TABLE> tag as shown below.

**XYZ Company Ltd.,**

Salary Statement

Employee Name   : ----
Department        : ----
Designation       : ----
Basic Salary      : ----

| Allowances | Percentage | Amount |
|---|---|---|
| TA | -- | -- |
| DA | -- | -- |
| HRA | -- | -- |
| Total Allowance: ----- | | |
| Deductions | Percentage | Amount |
| PF | -- | -- |
| LIC | -- | -- |
| Total Deduction: ----- | | |

Gross Salary     : -----
Net Salary       : -----

21. Write a JSP program to sort a two dimensional array. Initialize the two dimensional array statically.

22. Write a multilayered JSP application to accept and store student information. Accept student name, register number, course, combination, semester, marks obtained in five subjects as input through a proper user interface page. Design course, combination and semester as combo boxes. Store the accepted details in the MS Access table.

23. Write a multilayered JSP application to accept and store student information. Accept student name, register number, course, combination, semester, marks obtained in five subjects as input through a proper user interface page. Design course, combination and semester as combo boxes. Calculate total marks, percentage marks and grade. Along with student details, store the total marks, percentage marks and grade in MS Access table.

24. Write a multilayered JSP application to read and store employee information. Read employee name, employee identification number, Department, Designation, Basic Salary, TA, DA, HRA, PF, LIC (in percentage) as input through a proper user interface page. Also calculate TA Amount, DA Amount, HRA Amount, PF Amount, LIC Amount, Total Allowances, Total Deductions, Gross Salary and Net Salary components of the employee. Along with the employee information store the salary details in the MS Access table.

## BCA 601: COMPUTER NETWORKS

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**Unit 1: Basics:** 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                    **08 Hrs**

**Unit 2: Reference models:** 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, Example data communication services   **10 Hrs**

**Unit 3: The network layer:** 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.            **10 Hrs**

**Unit 4: The transport layer:** 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.                    **08 Hrs**

**Unit 5:** The Internet transport protocol (TCP & UDP)- the service model, the TCP segment header, the TCP connection management. UDP - header.                    **04 Hrs**

**Unit 6: The Application layer:** Network security - traditional cryptography, two fundamental cryptographic principles, secret key & public key algorithms.  DNS - Name space, SNMP - model. Electronic mail, architecture and services, www.                    **08 Hrs**

**Reference books:**
1. Data and Computer Communications – William Stallings.
2. Computer Networks – Andrew S. Tanenbaum.
3. Data Communication – Ulysis D Black.
4. Data Communication and Networking – Behrouz A. Forouzan.
5. Internetworking with TCP/ IP – Douglas E comer, PHI

## QUESTION PAPER PATTERN

| PART I | 10 Marks | There shall be 10 question each carrying 01 Marks. The student has to attend all the 10 question. | 10 question from all the Units |
|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1. 02 question from Unit 2. |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 02 question from Unit 3. 02 question from Unit 4. 01 question from Unit 5. 02 question from Unit 6. |

## BCA 602: UNIX OPERATING SYSTEM

**Theory Examination – 80 Max Marks**            **Internal Assessment – 20 Max Marks**

**Unit – 1 : Introduction:** 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, Email Basics, mailx, passwd, who, uname, tty, stty.                                                                                       **06 Hours**

**Unit -2 : The File System :** 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.                                                                                       **07 Hours**

 **Unit - 3 : Basic File Attributes:**  Listing file attributes, listing directory attributes, File Ownership, File Permissions, changing file permissions, Directory Permissions, Changing File Ownership.                                                                                       **04 Hours**

**Unit -4 : The Vi Editor:** 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., Advanced VI Editor                                   **08 Hours**

**Unit - 5 :The process:** 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.                                                                                       **06 Hours**

**Unit – 6 :  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 and egrep, sed, line addressing, using multiple instructions, context addressing, writing selected lines to a file, text editing, substitution, basic regular expressions revisited.                                                                                       **07 Hours**

**Unit -7 : The Shell:** 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.                                   **10 Hours**

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

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|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1.<br>01 question from Unit 2. |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from Unit 3.<br>02 question from Unit 4.<br>01 question from Unit 5.<br>01 question from Unit 6<br>02 question from unit 7 |

## BCA 603: DOT NET PROGRAMMING

**Theory Examination – 80 Max Marks**          **Internal Assessment – 20 Max Marks**

**Unit1: Introduction to C# & .NET platform :** The .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.                                                                    **06Hrs**

**Unit 2: 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# "preprocessor" directives.                                            **08Hrs**

**Unit 3: C# language fundamentals :** 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.

**06Hrs**

**Unit 4: Exception & object life time :** Role of .NET exception handling, throwing a generic exception, catching exceptions, the final block.                                            **06Hrs**

**Unit 5: Interface & Collections :** Definition, Interface members at object level, interface as polymorphic agents, exploring the system.collections namespaces.                        **06Hrs**

**Unit 6: windows forms :** A tale of three GUI namespaces, overview of the system.windows.Forms Namespaces, Anatomy of a Form, Component class, control class, controle, **Programming with windows forms controls :** Working with button types, check boxes, Radio buttons, Group boxes, list boxes, calander control, assigning tooltips for controls.

**08Hrs**

**Unit 7: Data acess with** ADO.NET **:** The need for ADO.NET, two faces of ADO.NET, role of ADO.NET data providers, Building a simple test database, selecting a data provider, working with connected layer of ADO.NET & OleDb Data reader, inserting, updating and deleting records using OleDb command.**Introduction to** ASP.NET **:** Standard controls, list controls, validation controls, Rich controls.                                                                    **08Hrs**

**References Book:**
1. "C# & The .NET Platform" second edition by author Andrew Troelsen

## QUESTION PAPER PATTERN

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|---|---|---|---|
| PART II | 20 Marks | There shall be 03 question each carrying 10 Marks. The student has to attend any 02 question. | 01 question from Unit 1. 02 question from Unit 2. |
| PART III | 50 Marks | There shall be 07 question each carrying 10 Marks. The student has to attend any 05 question. | 01 question from unit 3. 01 question from Unit 4. 01 question from Unit 5. 02 question from Unit 6 02 question from unit 7 |

## BCA 604: UNIX and .NET Lab

### PRACTICAL EXAMINATION SCHEME

Practical Proper - 70 Marks

Viva – voce - 10 Marks

| Part –A | One Program Max marks 30 | Program writing | 15 Marks |
|---|---|---|---|
| | | Error free compilation or partial output | 10 Marks |
| | | Correct result with proper display | 5 Marks |
| Part - B | One Program Max marks 40 | Program writing | 20 Marks |
| | | Error free compilation or partial output | 10 Marks |
| | | Correct result with proper display | 10 Marks |

### PART A

1) Write a shell script to count no of characters in a given string
2) Write a shell script to check of vowels
3) To check for palindrome or not
4) To check given string is reverse or not
5) To find factorial of a no
6) To find out biggest of 3 no
7) To display student information
8) To display employee information ( bs=10000, HRA=20%, DA=50% )
9) To perform mathematical operations
10) To check sent mail delivered or not
11) To remove junk files
12) To remove all files in tmp directory
13) To create nested directory
14) To check whether the given no is odd or even
15) To display current date, time and name of month & present calendar using cal & date command(with option )

16) To display list of files beginning with chap along with file permissions & change the permission group to rwx.
17) To convert lower case to upper case
18) To match particular pattern in a file & display in count
19) Swapping of 2 no without using temp.
20) To demonstrate  for loop
21) To check whether current date valid or not
22) Taking system date as arguments find out whether its Morning or Afternoon or Night
23)  To convert set of lines into columns
24) To find out GCD of a no
25) Write a shell script that accepts filename starting & ending line no as an argument & display all lines b/w given line no
    a)  Paging lines
    b)  Selecting 1$^{st}$ 4 lines & assign to another file as short list
    c)  Cut the column wise
    d)  Cut field wise
    e)  Paste the cutted file
    f)  Sort in order of 1$^{st}$ field
    g)  Exit
26)  Write shell script
    a)  Listing of files
    b)  Processor of user
    c)  Present date
    d)  exit

## PART B
## .NET PROGRAMMING


## BCA 605: Project Work


### PRACTICAL EXAMINATION SCHEME
Project Report    - 20  marks
Project Demo     -30 Marks
Viva-Voce        - 30 marks


   The  objective  of  the  project  is  to  motivate  the  students  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 VI semester and a student is expected to do planning, analysis,  design,  coding  and  implementation  of  the  project.  The  initiation  of  project should be with the project proposal.
 The Project work should be done in a group of not more than four members.