

B.Sc. CSMIII
Semester-V
BCSMDSE(C)-501: OPERATING SYSTEM
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

Credits:4

External Examination:75

Internal Assessment:25

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three Units I, II & III, Each Unit I, II will have four questions from the respective Units of the syllabus. Each will have 12 marks. Unit III will consist of one compulsory question having 9 Questions of short-answer type covering the entire syllabus uniformly. All the questions will carry 3 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two question from each Unit I & II and the compulsory question of Unit III. All the questions will carry equal marks.

Objectives: To learn the fundamentals of Operating Systems. To learn the mechanisms involved in memory management in contemporary OS. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

UNIT-I

Introduction: Need of Operating system. types of operating systems: Batch processing operating system, Multiprogramming operating system, Time sharing operating system, Multitasking operating system, Distributed operating system, Network operating system, Real time operating system, Multiprocessor system and parallel processing.

Process Management: Process concept, types of Process scheduling, Basic concept of CPU Scheduling, Scheduling criteria, and Scheduling algorithms: FCFS, SJF, Round Robin & Queue Algorithms.

Deadlocks: Deadlock characterization, Methods for handling deadlocks, Banker's Algorithm.

UNIT-II

Memory Management: Logical versus Physical address space, Swapping, Contiguous allocation, Paging, Segmentation.

Virtual Memory: Demand paging, Performance of demand paging, Page replacement, Page replacement algorithms, Thrashing.

File Management: File system Structure, Allocation methods: Contiguous allocation, Linked allocation, Indexed allocation, Free space management: Bit vector, Linked list, Grouping, Counting.

Device Management : Disk structure, Disk scheduling : FCFS, SSTF, SCAN, C-SCAN, LOOK, Selecting disk scheduling algorithm.

Text Book:

1. Silberschatz and Galvin, "Operating System Concepts", Addison-Wesley publishing, Co.

References:

1. S. Tanenbaum, "Modern Operating Systems", Pearson Education.

2. M. Dhamdhere, "Operating Systems – A Concept Based Approach", McGraw-Hill.

B.Sc. Non Medical III
Semester-V
BCSMDSEC(C)-501(A): SOFTWARE LAB BASED ON LINUX OS
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

Credits:2

External Marks:50

The setting and evaluation will be done by a board of examiners consisting of Head External Examiner and the teacher(s) involved with the teaching of this paper.

The practical paper will consist of four exercises and the candidates will be required to attempt any three exercises.

The breakup of marks for the University Examination will be as under:

Viva-voce:10

Exercises:20

Lab. Record:20

Use of Basic LINUX commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd, cal, cat, mv, cp, man, date, chmod, grep, tput (clear, highlight), bc, pipe, more.

Shell introduction and Shell Scripting:- What is shell and various type of shell, Various editors present in linux Different modes of operation in vi editor, Writing and executing the shell script, Shell variable (user defined and system variables), System calls, Using system calls Pipes and Filters Decision making in Shell Scripts (If else, switch), Loops in shell Functions Utility programs (cut, paste, join, tr , uniq utilities) Pattern matching utility (grep)

1. Write a shell script to check if the number entered at the command line is prime or not.
2. Write a shell script to modify “cal” command to display calendars of the specified months.
3. Write a shell script to modify “cal” command to display calendars of the specified range of months.
4. Write a shell script to accept a login name. If not a valid login name display message – “Entered login name is invalid”.
5. Write a shell script to display date in the mm/dd/yy format.
6. Write a shell script to display on the screen sorted output of “who” command along with the total number of users .
7. Write a shell script to display the multiplication table any number,

B.Sc. (CSM)-III
Semester-V
BCSMDSE(S) 502: LINEAR PROGRAMMING

L T P
4 0 2

Max. Marks: 75
External Examination 55
Internal Assessment 20
Minimum pass marks 35%

Instructions for the Paper setter/Candidates

The Question paper will consist of three Sections A, B and C. Sections A and B will have four questions from respective sections of the syllabus. Each will have 09 marks. The students are required to attempt two questions from each section. Section C will be compulsory have only one question which will consist of ten short answer type parts covering the whole syllabus. This question carries 19 marks. **Use of scientific non-programmable calculator is allowed.**

SECTION – A

Linear Programming Problems (LPPs): Basic concepts, lpp's Examples, Mathematical formulation, Graphical solution, Solution by Simplex method, Big-M method and two phase simplex method. **Duality in Linear Programming:** Concept, Mathematical formulation, duality and simplex method and dual simplex method.

Sensitivity Analysis: Discrete change in the cost vector; requirement vector and co-efficient matrix.

SECTION – B

Transportation Problem: Initial basic feasible solution:- North West Corner Method, Least Cost Method and Vogel's Approximation. Its optimal solution using MODI method (for balanced case only).

Assignment Problem: Solution of balanced and unbalanced assignment problems, maximization case in assignment problem.

Quadratic programming; Wolfe's modified simplex method.

Integer Programming Problems: pure & mixed integer problems, Branch and Bound method

TEXT BOOKS

1. Swarup, Kanti, Gupta, P. K. and Manmohan: 'Operation Research', Sultan Chand and Sons, New Delhi, Ed.2005.
2. Gupta, P.K., Hira, D.S.: 'Operation Research', Sultan Chand and Sons, New Delhi.
3. Sharma, S.D. 'Operations Research', KedarNath Ram Nath, India, 4th Edition.

B.Sc. (CSM)-III

Semester-V

BCSMDSE(S) 502(A): PRACTICAL OF LINEAR PROGRAMMING

Credits: 2

Max. Marks: 25

External marks:25

Instructions for the paper setter /candidates

The setting and evaluation will be done by a board of examiners consisting of Head, External examiner and the teacher(s) involved with the teaching of this paper.

The practical paper will consist of four exercises and the candidates will be required to attempt any three exercises. **Use of scientific non-programmable calculator is allowed.**

The break-up of marks for the University Examination will be as under:

Exercises: 15

Practical Record: 04

Viva-voice: 06

Lab Course:

The examination will be based on the syllabus of the papers DSE CSM-504(LP)

LIST OF PRACTICALS:

1. Linear Programming Problems
 - a) Simplex method
 - b) Big M- Method and two –phase simplex
 - c) Dual Simplex Method
2. Assignment problems
 - a) Balanced b) un-balanced
3. Transportation problems
 - a) Balanced b) un-balanced
- 4) Modi Method
- 5) Integer Programming
- 6) Quadratic Programming

**B.Sc. CSM III
SEMESTER-V**

**BCSMDSE(M)-503(A): GEOMETRY AND VECTOR CALCULUS
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)**

L T P
5 1 0

Max. Marks: 100
External Examination 75
Internal Assessment 25
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of twelve marks. Section C will have one compulsory question having nine parts of short-answer type covering the entire syllabus uniformly. Each will consist of three marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION A

Parabola: Pole and polar, pair of tangents from a point, chord of contact, equation of chord in terms of midpoints and diameter of conic, Sub tangent and Subnormal and its geometrical properties.

Ellipse: Properties of ellipse, parametric representation of ellipse, tangents, normal, equation of chord joining two points on ellipse. Director circle of ellipse, chord of contact, conjugate lines and conjugate diameter, Co normal Points and its geometrical properties.

Hyperbola: Properties of hyperbola, fundamental rectangle, parametric representation of hyperbola, asymptotes of hyperbola, Conjugate hyperbola, rectangular hyperbola, tangents and normal.

SECTION-B

Sphere: General equation of a sphere, Plane section of a sphere, Intersection of two spheres, Sphere through a given circle, Intersection of a straight line and a sphere, Equation of a tangent plane to sphere, Condition of tangency. Plane of contact, Orthogonal Spheres, Angle of intersection of two spheres, Length of tangent, radical plane, coaxial system of spheres.

Cone: Equation of a cone whose vertex is at origin, Equation of a cone with a given vertex and a given conic as base, Condition that general equation of second degree represent a cone, Equation of a tangent plane, Condition of tangency of a plane and a cone, Reciprocal cone, Right circular cone

Vector differentiation, Gradient, divergence and curl. Vector integration Theorems of Gauss, Green, Stokes and problems based on these.

TEXT BOOKS:

1. S. L. Loney: The Elements of Coordinate Geometry, Macmillan and Company, London, 2015.
2. G. Prasad and H. C. Gupta: Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad, 2010.
3. P. K. Jain and Khalil Ahmad: A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd, 2014.
4. N. Saran and R.S. Gupta: Analytical Geometry of Three Dimensions, New Age International Publication, 2003.
5. R. J.T. Bell: Elementary Treatise on Coordinate Geometry of Three Dimensions, Macmillan India Ltd, 1912.
6. Shani Naryan: Analytic Solid Geometry, S Chand & Company, 2017.

**B.Sc. CSM III
SEMESTER-V**

**BCSMDSE(M)-503(B): METRIC SPACES
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)**

L T P
5 1 0

Max. Marks: 100
External Examination 75
Internal Assessment 25
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of twelve marks. Section C will have one compulsory question having nine parts of short-answer type covering the entire syllabus uniformly. Each will consist of three marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Properties of Real Numbers, Finite, Countable and Uncountable Sets.

[Scope as in Chapter 1(1.1-1.23), Chapter 2(2.1-2.14) of Text 1]

Metric spaces: definition and examples. Sequences in metric spaces, Cauchy sequences. Complete Metric Spaces.

Open and closed balls, neighbourhood, open set, interior of a set, Limit point of a set, closed set, diameter of a set, Cantor's Theorem, Subspaces, dense sets, separable spaces.

SECTION –B

Compact sets, perfect sets, connected sets.

[Scope as in Chapter 2(2.31-2.47) of Text 1]

Limit of a function, Continuous mappings, Continuity and compactness, continuity and connectedness, Discontinuities, Uniform continuity, Monotonic functions, infinite limit and limits at infinity.

[Scope as in Chapter 4 of Text 1]

TEXT BOOKS:

1. W. Rudin: Principles of Mathematical Analysis, McGraw Hill, 3rd Ed., 1976.
2. Tom M. Apostol: Mathematical Analysis, second edition. Narosa Publishing House, Reprint 2002.

3. S.C Malik and Savita Arora: Mathematical Analysis, New Age International Publishers, Reprint 2008.
4. R.G. Bartle and D. R. Sherhert: Introduction to Real Analysis, third edition. John Wiley & Sons, Inc., 2000.
5. P. K. Jain, O. P. Ahuja, & Khalil Ahmad, Metric Spaces, Alpha Science International Ltd.2004.
6. Babu Ram, Metric Spaces, Narendra Publishing House, 2005.

B.Sc. CSM-III
Semester-V
BCSMSEC(C)-504: OBJECT ORIENTED PROGRAMMING USING C++

Credits:2

M. Marks:50

Objective: Understand fundamentals of object oriented programming including defining classes, invoking methods, using class libraries, etc. To Be aware of the important topics and principles of software development. To Have the ability to write a computer program to solve specific problems.

Introduction: Object oriented programming approach, characteristics of object oriented languages.

Class and Object Declaration: Class members: Data members (fields) and member functions (methods). Class member visibility (private, public, protected). Class variables and instance variables. Accessing class data members, Accessing member functions, Arrays of Objects, Objects as function arguments

Constructors and Destructors: Declaration and Definition, Default Constructors, Parameterized Constructors, Constructor Overloading.

Inheritance-Extending Classes Concept of inheritance, Base class, Derived class, Defining derived classes, Visibility modes , Single inheritance, Access Control to private and protected members ,Multilevel inheritance.

Polymorphism: Definition, early Binding, Virtual Functions, late binding, pure virtual functions.

Exceptional Handling: Exception handling fundamentals

.Example Programs:

1. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
2. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
3. Create a class Box containing length, breadth and height. Include following methods in it: a)Calculate surface Area B)Calculate Volume c)Increment, Overload ++ operator (both prefix & postfix) decrement, Overload --operator (both prefix & postfix) e)Overload operator = = (to check equality of two boxes), as a friend function f)Overload Assignment operator g)Check if it is a Cube or cuboid. Write a program which takes input from the user for length, breadth and height to test the above class.
4. Create a class Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
5. Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks

Text Books:

- 1.Object Oriented Programming with C++, E. Balagurusamy, Fourth Edition, Tata Mc-Graw Hill
2. Object Oriented Programming in Turbo C++,Robert Lafore, Fourth Edition Galgotia Publications

B.Sc. CSM-III
Semester-V
BCSMSEC(S)505: VITAL STATISTICS

L T P
2 0 0

Max. Marks: 50
External Examination 40
Internal Assessment 10
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of six marks. Section C will have one compulsory question having eight parts of short-answer type covering the entire syllabus uniformly. Each will consist of two marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

Use of scientific non-programmable calculator is allowed.

SECTION – A

Vital Statistics: Introduction, Methods and Uses of Vital Statistics, Measurement of Population Rates and Ratio of Vital Events, Measurement of Fertility: Crude Birth Rate, General Fertility Rate, Specific Fertility Rate, Total Fertility Rate. Measurement of Mortality: Crude Death Rate, Infant Mortality Rate, Standardized Death Rate and Causes of Death Rate.

SECTION – B

Life Table: Assumptions, Description and Construction of Life Table and its Uses (Only Examples), Stationary and Stable Population (Only Definition). Measurement of Population Growth: Crude rate of natural increase and Pearl's Vital Index, Gross Reproduction Rate, Net Reproduction Rate with examples.

TEXT BOOKS

1. Gupta, S.C., Kapoor, V. K.: Fundamentals of Applied Statistics, Sultan Chand & Sons Educational Pub. New Delhi 2014.
2. Goon, A.M., Gupta, M.K. and Dasgupta, B.: An outline of Statistical Theory Vol. -II, World Press Pvt. Ltd., 2008.
3. Gupta, S.P.: Statistical Methods, Sultan Chand & Sons Educational Pub. New Delhi.

B.Sc. CSM III
SEMESTER-V
BCSMSEC(M)-506(A): VECTOR SPACES
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

L T P
2 0 0

Max. Marks: 50
External Examination 40
Internal Assessment 10
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of six marks. Section C will have one compulsory question having eight parts of short-answer type covering the entire syllabus uniformly. Each will consist of two marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Vector spaces, definition and elementary properties. Subspaces, linear dependence and Independence, basis and dimension. Direct sums and complements. Matrices and change of basis.

SECTION-B

Linear transformations, algebra of linear transformations, Representation of linear transformations by matrices, change of basis, rank-nullity theorem. Dual spaces. Characteristic polynomials and characteristic roots, minimal polynomials.

TEXT BOOKS:

1. Vijay K. Khanna and S. K. Bhambri: A course in Abstract Algebra, S. Chand(G/L) & Company Ltd. 1998.
2. P. B. Bhattacharya, S.K. Jain and S.R. Nagpaul: First Course in Linear Algebra, John Wiley & Sons, 1983.
3. V. K. Krishna Murti and J. L. Arora: An Introduction to Linear Algebra, 1976.
4. Seymour Lipschitz: Linear Algebra, Schaum's Outline series, McGraw Hill Education, 2017.
5. S. Lang: Linear Algebra, Undergraduate Texts in Mathematics, Springer-Verlag, New York, 1997.

**B.Sc. CSM III
SEMESTER-V**

BCSMSEC(M)-506(B): LAPLACE TRANSFORM AND ITS APPLICATIONS

(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

L T P
2 0 0

Max. Marks: 50
External Examination 40
Internal Assessment 10
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of six marks. Section C will have one compulsory question having eight parts of short-answer type covering the entire syllabus uniformly. Each will consist of two marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Basic Theory of Laplace Transforms, Sufficient conditions for existence of Laplace Transform, Laplace Transform Solution of Initial Value Problems, Laplace Transform of integral, Translation Theorems(Shifting Theorems), Heaviside Function(Unit Step Function).

[Scope: Chapter -8 (8.1-8.4.1) R. K. Jain and S. R. K. Iyengar : Advanced Engineering Mathematics]

SECTION-B

Laplace transform of Dirac-Delta function, Differentiation of Laplace transform, Integration of Laplace Transform, Convolution theorems, Laplace transform of periodic functions. Laplace transform methods to solve some ordinary differential equations

[Scope: Chapter -8 (8.5-8.7) R. K. Jain and S. R. K. Iyengar : Advanced Engineering Mathematics]

TEXT BOOKS:

1. R. K. Jain, and S. R. K. Iyengar: Advanced Engineering Mathematics, Narosa Publishing House, 5th Ed., 2016.
2. E. D. Rainville: Special Functions, Chelsea Pub Co., 1971.
3. Babu Ram: Advanced Engineering Mathematics, Pearson Education India, 2012.
4. E. Kriszig: Advanced Engineering Mathematics, Wiley Publications, 2011.

B.Sc. CSM III
Semester-VI
BCSMDSE(C)-601: SOFTWARE ENGINEERING
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

Credits:4

External Examination:75

Internal Assessment:25

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three Units I, II & III, Each Unit I, II will have four questions from the respective Units of the syllabus. Each will have 12 marks. Unit III will consist of one compulsory question having 9 Questions of short-answer type covering the entire syllabus uniformly. All the questions will carry 3 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two question from each Unit I & II and the compulsory question of Unit III. All the questions will carry equal marks.

Objective: To learn the basic SW engineering methods and practices and their appropriate application. Describe software engineering layered technology and Process framework. A general understanding of software process models such as the waterfall and evolutionary models.

Unit-I

Introduction: Evolution Software Engineering, Software Crisis, Trends in Software Engineering.

Software Life Cycle Models: Use of models, Waterfall Model, Iterative Waterfall model, Prototype Model, Evolutionary Model, Spiral model, Comparison of models

Software Project Management: Project Planning, Project size estimation and Technique, COCOMO Model, Scheduling, Staffing, Risk management.

Requirements Analysis and Specification: Requirement Gathering and Analysis , Software requirement Specification Document, Functional requirement, Non Functional requirement, Organization of SRS Document.

Software Design: characteristics of Good software design, Design Principles:- Modularity, Cohesion, coupling.

Function Oriented design: Structured Analysis, Data Flow Diagram, Structure Charts

Unit -II

Object Oriented Design using UML: Object oriented concepts, Unified Modeling Language, UML Diagrams, Class diagrams, State diagrams, Interaction Diagram

User Interface Design: Characteristics of Good User interface, Types of User interface, GUI Development.

Coding: Coding Standards and Guidelines, Code Review, Software Documentation

Testing: Error, Failure, Test case, Test Suite, Levels of Testing, Unit testing, Black Box testing, White Box Testing, Integration Testing, System Testing.

Text Book:

1. Rajib Mall, "Software Engineering", PHI Publication.

References:

1. P. Jalote, "An Integrated Approach to Software Engineering", Narosa Publications.
2. Shari Lawrence Pfleeger, " Software Engineering : Theory and Practice", 2nd edition, Pearson Education, 2003.
3. Roger.S.Pressman," Software Engineering-A practitioner's Approach", 3rd edition,McGraw-Hill.

B.Sc. CSM III

Semester-VI

BCSMDSE(C)-601(A): SOFTWARE LAB BASED ON SOFTWARE ENGINEERING

(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

Credits: 2

External Marks:50

The setting and evaluation will be done by a board of examiners consisting of Head External Examiner and the teacher(s) involved with the teaching of this paper.

The practical paper will consist of four exercises and the candidates will be required to attempt any three exercises.

The breakup of marks for the University Examination will be as under:

Viva-voce:10

Exercises:20

Lab. Record:20

Develop Project by using any studied Programming Language and project management software

Sample Projects

- PRTC Route Information: Online information about the bus routes and their frequency and fares.
- Carpooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.
- Patient Appointment and Prescription Management System
- Organized Retail Shopping Management Software
- Parking Allocation System
- Wholesale Management System.
- E-Payment System.

Use of Template of Project File

B.Sc. (CSM)-III
Semester-VI
BCSMDSE(S) 602: DESIGN OF EXPERIMENT

L T P
4 0 2

Max. marks: $\left\{ \begin{array}{l} \text{Ext. Examination} - 55 \\ \text{Int. Assessment} - 20 \end{array} \right\} 75$

Instructions for the Paper setter/Candidates

The Question paper will consist of three Sections A, B and C. Sections A and B will have four questions from respective sections of the syllabus. Each will have 09 marks. The students are required to attempt two questions from each section. Section C will be compulsory have only one question which will consist of ten short answer type parts covering the whole syllabus. This question carries 19 marks. **Use of scientific non-programmable calculator is allowed.**

SECTION – A

Linear Models: The fixed effect models, the distribution of minimum error sum of squares and the conditional error sum of squares, tests of general linear-hypotheses. Analysis of one way classified data under the fixed effect model.

Analysis of the two way classified data with one observation per cell and multiple but equal observations in cells under the fixed effect model. Terminology in experimental designs, basic principles of design- Randomization, replication and local control, Need for design of experiment. Completely Randomized design, randomized block design.

SECTION – B

Latin square design and their advantage and disadvantage.

Incomplete Block Design(IBD): Need, Importance and Basic Concept.

BIB Designs: Definition, parametric relations, BIB designs related to a given BIBD and analysis (without recovery of inter-block information).

PBIB Design: Introduction, Definition of Association schemes and PBIB designs with m associate classes, relations between the parameters of association schemes with m-associate classes, association matrices.

Factorial Experiments: Concept of factorial experiments, the concept of main effects and interactions in 2^2 and 2^3 factorial experiments and sum of squares due to them. Yate's method of computing the sum of squares due to the main effects and interactions in 2^2 and 2^3 factorial designs.

TEXT BOOKS

1. Goon, A.M., Gupta, M.K. and Dasgupta, B.: Fundamentals of Statistics, Vol.II, World Press, 6TH ED. (revised and enlarged), 2008.

2. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, Sultan Chand & Sons Educational Pub. New Delhi 2014.

Ref Books:-

1. Dey Alok:- Incomplete Block Designs, Hindustan Book Agency, 2010.

B.Sc. (CSM)-III
Semester-VI
BCSMDSE(S) 602(A): PRACTICAL OF DESIGN OF EXPERIMENT

Credits: 2

Max. Marks: 25

External Marks: 25

Instructions for the paper setter /candidates

The setting and evaluation will be done by a board of examiners consisting of Head, External examiner and the teacher(s) involved with the teaching of this paper.

The practical paper will consist of four exercises and the candidates will be required to attempt any three exercises. **Use of scientific non-programmable calculator is allowed.**

The break-up of marks for the University Examination will be as under:

Exercises: 15
Practical Record: 04
Viva-voice: 06

Lab Course:

The examination will be based on the syllabus of the papers DSE CSM-604 (Design of Experiment)

LIST OF PRACTICALS:

1. Example based on
 - a) Analysis of variance: One way classification, two way classification with m observations per cell.
 - b) Design: CRD, RBD, LSD, BIBD, PBIBD
 - c) 2^2 and 2^3 factorial experiments

**B.Sc. CSM III
SEMESTER-VI**

**BCSMDSE(M)-603(A): INTEGRAL CALCULUS
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)**

L T P
5 1 0

Max. Marks: 100
External Examination 75
Internal Assessment 25
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of twelve marks. Section C will have one compulsory question having nine parts of short-answer type covering the entire syllabus uniformly. Each will consist of three marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Integration of hyperbolic and inverse hyperbolic functions. Reduction formulae for integrals of rational, trigonometric, exponential and logarithmic functions and their combinations, quadrature, rectification. Improper integrals and their convergence, Beta – Gamma Functions and their properties, duplication formula, convergence of Beta and gamma functions. Comparison tests, Absolute and conditional convergence, Abel's and Dirichlet's tests (without proofs)

SECTION- B

Riemann integral, Lower and Upper Riemann sums, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus. Double and Triple integrals, Change of order of integration in double integrals, Change of variables. Applications to evaluation of areas and Volume.

TEXT BOOKS:

1. G. B. Thomas and R. L. Finney: Calculus, Addison Wesley Education, Delhi, 11th Ed., 2005.
2. H. Anton, I. Bivens and S. Davis: Calculus, John Wiley and Sons (Asia) P. Ltd, 2016.
3. S.C. Malik and Savita Arora: Mathematical Analysis, New Age Sciences, 2009.
4. Gorakh Prasad: Integral Calculus Pothishala Private Limited, 2015.
5. Shanti Narayan: Integral Calculus, S. Chand, 2005.

**B.Sc. CSM III
SEMESTER-VI**

**BCSMDSE(M)-603(B) PARTIAL DIFFERENTIAL EQUATIONS & ITS APPLICATIONS
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)**

L T P
5 1 0

Max. Marks: 100
External Examination 75
Internal Assessment 25
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of twelve marks. Section C will have one compulsory question having nine parts of short-answer type covering the entire syllabus uniformly. Each will consist of three marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Partial differential equations of the first order: Formation of Partial differential equations, solution of Partial differential equations. Lagrange's Equation, Cauchy's Problem for first order equations, Integral surfaces passing through a given curve, surfaces orthogonal to a given system of surfaces. Nonlinear Partial differential equations of the first order, compatible system of first order equations, Charpit method, Special types of first order equations: Equations involving only p and q , Equations not involving the independent variables, Separable Equations, Clairaut's equation.

SECTION B

Partial differential equations of the second order and their classification into hyperbolic, elliptic and parabolic equations, their transformation into Canonical forms, Homogeneous and Non-homogeneous Linear partial differential equations of second and higher order with constant coefficients, Homogeneous Linear partial differential equations of second and higher order with variable coefficients,

Fourier series, Fourier Series Expansions of Even and Odd Functions, Convergence of Fourier Series, Fourier Half-Range Series. [Scope as in Chapter-9(9.1-9.4) of Text 2]

One dimension Wave and Heat equation, Two dimensional Laplace equation, solutions of second order linear partial differential equations by Separation of Variables, D'Alembert's solution of Wave equation.

TEXT BOOKS:

1. I. N. Sneddon: Elements of Partial Differential Equations, Dover Publications, Inc. Mineola, New York 2006.
2. R. K. Jain, and S.R.K Iyengar: Advanced Engineering Mathematics, Narosa Publishing House, 5th Ed. 2016.
3. M. D. Rai Singhania: Ordinary and Partial Differential Equations, S. Chand & Company, New Delhi, 2013.
4. Babu Ram: Advanced Engineering Mathematics, Pearson Education India, 2012.

B.Sc. CSM III
Semester-VI
BCSMSEC(C)-604: VISUAL PROGRAMMING
(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

Credits:2

M. Marks:50

Objective: Provide students with the methods and technologies to produce a high-quality software projects using visual components. Learning any open GUI tool

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

Introduction to GUI controls: Text Boxes, Buttons, Labels, Checkboxes, and Radio Buttons, List Boxes, Combo Boxes, Picture Boxes, Scrollbars, Toolbars, Status Bar and Progress bars, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

Operations: Data types, constants, declaring variables, scope of variables, arithmetic operations, formatting data.

Decision and Iteration Handling : Decision branching constructs, looping constructs, nested control structures, switch, break and continue statements

Forms Handling : Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, referring to objects on a different forms.

Practical exercises based on concepts listed in theory.

Implementing applications by using various GUI control tools such as

1. Text Boxes
2. Buttons
3. Labels
4. Checkboxes
5. Radio Buttons
6. List Boxes
7. Combo Boxes
8. Picture Boxes
9. Scrollbars,
10. Toolbars,
11. Status Bar
12. Progress bars,

**B.Sc. CSM III
SEMESTER-VI**

BCSMSEC(S)-605 : OPTIMIZATION TECHNIQUE-I

L T P
2 0 0

Max. Marks: 50
External Examination 40
Internal Assessment 10
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of six marks. Section C will have one compulsory question having eight parts of short-answer type covering the entire syllabus uniformly. Each will consist of two marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

Use of scientific non-programmable calculator is allowed.

Section-A

Queueing Problems: Classification of Queueing Models, Characteristics of Queueing System. Distribution in Queueing Systems, Poisson arrivals and Exponential service times, [(M/M/1)(∞ /FCFS)] Model, Measures of [(M/M/1)(∞ /FCFS)] model, General Erlang Queueing model based on (M/M/1)(N/FCFS) Model

Section-B

(M/M/S)(N/FCFS) Queueing Model, Measures of M/M/S, steady-state solution and their measures of effectiveness.

Job Sequencing: Introduction, Solution; n jobs on 2 machines, m jobs on 3 machines, 2 jobs on m machines, n jobs on m machines.

Text Books:

1. Hira, D.S. and Gupta, P.K. Operations Research, Sultan Chand and Sons, New Delhi, 2008.
2. Sharma, S.D. Operations Research, KedarNath Ram Nath, India, 4th Edition.
3. KantiSwarup, P.K. Gupta and Man Mohan. Operations Research, Sultan Chand and Sons, New Delhi, 2nd Edition.
4. Gross, D., Shortle, J.F., Thompson, J.M. and Harris, C. M. : Fundamentals of Queueing Theory, 4th Edition.

**B.Sc. Non-Medical III
SEMESTER-VI**

BCSMSEC(M)-606(A) : SOME SPECIAL FUNCTIONS

(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

L T P
2 0 0

Max. Marks: 50
External Examination 40
Internal Assessment 10
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of six marks. Section C will have one compulsory question having eight parts of short-answer type covering the entire syllabus uniformly. Each will consist of two marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Legendre Polynomials – Orthogonal property of Legendre polynomials, Recurrence relations, Rodrigue's formula, generating function, Orthogonal and Orthonormal functions, Laguerre Polynomial-its Orthogonality, Recurrence relations.

SECTION-B

Chebyshev Differential Equation, Chebyshev polynomials of first and second kind and relation between them, Generating function, orthogonal property, Recurrence formulae. Bessel's functions. – Orthogonality of Bessel functions, Recurrence formulae, Generating function, Sturm-Liouville Problem

TEXT BOOKS:

1. R. K. Jain and S. R. K. Iyengar: Advanced Engineering Mathematics, Narosa Publishing House, 5th Ed., 2016.
2. M. D. Rai Singhania: Ordinary and Partial Differential Equations, S. Chand & Company, New Delhi, 2014.
3. E. D. Rainville: Special Functions, Chelsea Pub Co., 1971.

**B.Sc. CSM III
SEMESTER-VI**

BCSMSEC(M)-606(B): FOURIER INTEGRAL & FOURIER TRANSFORMS

(Common for B.Sc. Non Medical/ B.Sc. CSM/ B.A.)

L T P
2 0 0

Max. Marks: 50
External Examination 40
Internal Assessment 10
Minimum pass marks 35%

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B & C. Each of section A, B will have four questions from the respective syllabus. Each will consist of six marks. Section C will have one compulsory question having eight parts of short-answer type covering the entire syllabus uniformly. Each will consist of two marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all; selecting two questions from each section A & B. Section C is compulsory.

SECTION-A

Fourier Integral, Fourier Cosine and Sine integrals, Complex form of Fourier Integral representation .Applications of Fourier Series: Separation of Variables solution of Linear Partial Differential Equations, Fourier Series Solution of Laplace Equation.

[Scope as in Text 1 Chapter-9(9.5-9.5.5)]

SECTION-B

Fourier Transform, Linearity of Fourier Transforms, Fourier Transform of Derivatives, Fourier Transform of an Integral, Convolution, Fourier cosine transform, Fourier sine transform, Fourier cosine and sine transform of derivatives, Finite Fourier cosine transform, Finite Fourier sine transform, Fourier Transform solution of some Partial Differential Equations .

[Scope as in Text 1 Chapter-9(9.6-9.6.1)]

TEXT BOOKS:

1. R. K. Jain, and S. R. K. Iyengar: Advanced Engineering Mathematics, Narosa Publishing House, 5th Ed., 2016.
2. E. D. Rainville: Special Functions, Chelsea Pub Co., 1971.
3. S. L. Ross: Differential Equation, John Wiley & Sons, 1984.