



Syllabi of Subjects at Undergraduate Level

University of Jammu

**Faculty of
Mathematical
Science**

INDEX

S.No.	Faculty of Mathematical Sciences
1.	Computer Applications (BCA)
2.	B.A./B.Sc.(Computer Applications)
3.	Statistics
4.	Applied Mathematics
5.	Mathematics

**Bachelor of
Computer
Applications
(BCA)**

Semester – I

COMPUTER FUNDAMENTALS

Total Marks = 100

Semester Exam. = 80

Int. Assessment = 20

Duration of Examination: 3 Hrs

Unit I

History of Computer, Generations and Types (Analog Digital and Hybrid), Characteristics, applications, Benefits and limitations. CPU, Memory: Primary (RAM, ROM, PROM, EPROM, EEPROM), Secondary (Hard Disk, Optical disk, blue ray disk, pen drives), I/O Devices.

10 Hrs

Unit II

Number System: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number system. 1's Compliment and 2's Compliment. Conversion from one number system to another. Binary Arithmetic: Addition, subtraction, multiplication and division.

Software and its types, Computer languages and its types, Compiler, Interpreter, Assembler, Linker Loader.

10 Hrs

Unit III

Operating system and its functions. Types of Operating System (single user, multi user, time sharing, multitasking, multiprocessing and distributed). Windows Fundamentals: Anatomy of Windows, Desktop elements, managing files and folders, Installing Softwares.

Word processing and its features, spell check, Grammar Check, Thesaurus, Auto complete, text formatting, Importing and exporting files, Graphics, Tables, Templates and Wizards, Mail Merge, Macros.

10 Hrs

Unit IV

Spreadsheet and its features, Entering information in worksheet, Editing cell entry, Moving and Copying data, deleting and insertion cells, rows, columns, custom numeric formats. Working with Formulas and Cell Referencing, Absolute and relative addressing. Functions, Creating Charts, Filters: Auto and Advanced, Creating and using Macros.

Presentation software and its uses, Steps to create power point presentation, Power point views , Inserting pictures/images, Inserting Audio/ video clips, Animating slides etc.

10 Hrs

Suggested Readings:

1. P.K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications.
2. Alexix Leon, Mathewes Leon, Fundamentals of Information Technology,
3. Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
4. V. Rajaraman, Fundamentals of Computers,EEE.
5. Peter Norton, Introduction to Computers, Tata Mcgraw Hill
6. Joyce Coax , Joan Preppernau,,Steve Lambert and Curtis Frye,2007 Microsoft Office System step by step, Microsoft Press
7. R.K. Taxali, PC Software for Windows

Instructions for paper setters

The examination in each paper shall be of 3 hours duration. There shall be a total of nine questions of 16 marks each and the candidate has to answer five questions selecting one question from each unit. Question No.1 shall be a compulsory question.

The guidelines for paper setting are given below as:

- a. Q. No. 1 will be a compulsory question and shall consist of 4 sub-parts (each of 4 marks) distributed over the entire syllabus.

The paper setter shall set other eight questions selecting two from each unit.

PROBLEM SOLVING USING C-LANGUAGE

Total Marks = 100

Semester Exam.= 80

Int. Assessment = 20

Duration of the Examination: 3 Hrs

UNIT-I

Problem solving, Algorithm, flow chart, coding, compilation and debugging

History of C language, Structure of C program, compiling, and running a C program, Errors: syntax, linker and logical errors.

Character set of C language, identifiers, keywords, data types, variables, constants, expressions. Operators: Mathematical, Unary, Binary, Relational and Logical operators, Operator precedence and associativity.

10 Hrs

UNIT-II

Conditional Control statements: if statement, if else statement, nested if statement, if else if ladder and Ternary operator, Switch case statement, GOTO statement.

Looping control Statements: While loop, Do while Loop, For loop, Nested loops etc.

10 Hrs

UNIT-III

Functions: Definition, Prototypes, Types of Function, Scope, Call by Value.

Storage classes in C, Preprocessors, Macros.

Arrays (Single and double dimensional): Definition, Declaration, Accessing, Bound Checking, Passing to function.

Strings: Definition, Declaration, Accessing, Passing to function, Standard Library functions.

10 Hrs

UNIT-IV

Arrays and Pointers: Accessing single dimensional array using Pointers, Accessing 2D array using Pointers, Passing arrays to functions with pointers.

Structures & Unions: Declaring, Initializing and Accessing structures, Passing structures to functions, Array of Structures, Nested Structures, Unions initialization and accessing the members of a union.

10 Hrs

Suggested Readings:

1. Gottfried. B, Theory and problems of Programming with C Language, Tata Mc Graw Hill.
2. Kenneth. A, C Problem Solving and Programming, PHI.
3. Dan Gookin, C Programming, Wiley Dreamtech.
4. Y. P. Kanetkar, Understanding Pointers In C, BPB Publications.
5. Shubhnandan S. Jamwal; Programming in C; Pearson Publications; 1e, 2014
6. H.M. Deitel and P.J. Deitel, C How to Program, PHI.

Instructions for paper setter s

The examination in each paper shall be of 3 hours duration. There shall be a total of nine questions of 16 marks each and the candidate has to answer five questions selecting one question from each unit. Question No.1 shall be a compulsory question.

The guidelines for paper setting are given below as:

- a. Q. No. 1 will be a compulsory question and shall consist of 4 sub-parts (each of 4 marks) distributed over the entire syllabus.
- b. The paper setter shall set other eight questions selecting two from each unit.

PRACTICALS (BASED ON above 2 courses)

Total Marks = 100

Duration of the Examination: 3 Hrs

In this course the students shall be exposed to various practical problems based on courses BCA-101 and BCA-102. The Teacher-in-Charge shall design 30-40 problems based on these courses. The students shall be required to systematically work out the solution of those problems and implement using relevant tool in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct at least three internal evaluation tests for awarding the students for internal assessment. The students shall also be required to maintain proper record of each practical in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on regular tests, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:-

External Examination = 50 marks

Internal Examination/Assessment = 50 marks

Breakup for internal assessment:

- Regular Tests = 30 marks (A Minimum of three test shall be conducted during the entire semester. The marks for each test shall be distributed uniformly.)
- Practical File = 10 marks
- Attendance = 10 marks

Semester – II

DATA AND FILE STRUCTURES USING C-LANGUAGE

Total Marks = 100
Semester Exam. = 80
Int. Assessment = 20

Duration of the Examination: 3 Hrs

UNIT – I

Introduction and Classifications of Data Structures. Data Structure operations. Time and space complexity of algorithms. Rate of Growth: Big *O* Notation.

Arrays, concept of Stacks and Queues and their implementation using arrays, Recursion

10 Hrs

UNIT - II

Pointers in C, Dynamic Memory Allocation. Self-referential structures, Linked list, Type of Lists, Applications.

Trees, Binary Trees, Binary Tree Traversal, Binary Search Trees.

10 Hrs

UNIT - III

Sorting : Internal and External Sorts, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort

Searching: Liner Search & Binary Search.

Time and space complexity of sorting & search algorithms.

10 Hrs

UNIT - IV

File Structures:

Concepts of fields, records and files. Files: File Organization, Sequential Files, Structure, Operations, Disadvantages, Areas of use, Direct File Organization, Indexed Sequential File Organization and text files, Hashing techniques for direct files.

10 Hrs

Suggested Readings:

- 1) Data Structures - Seymour Lipschutz (Schaum's Outlines)
- 2) Data Structure and File Using C - Abhay Abhyankar.
- 3) Fundamental of Data Structure in C - Sahani.
- 4) Data Structure Using C - Radhakrishanan and Shrivastav.

Instructions for paper setter for courses with BCA codes

The examination in each paper shall be of 3 hours duration. There shall be a total of nine questions of 16 marks each and the candidate has to answer five questions selecting one question from each unit. Question No.1 shall be a compulsory question.

The guidelines for paper setting are given below as:

- a. Q. No. 1 will be a compulsory question and shall consist of 4 sub-parts (each of 4 marks) distributed over the entire syllabus.
- b. The paper setter shall set other eight questions selecting two from each unit.

FUNDAMENTALS OF DIGITAL ELECTRONICS

Total Marks = 100

Semester Exam. = 80

Int. Assessment = 20

Duration of the Examination: 3 Hrs

UNIT - I

Overview of computers, Integer & floating point representation using IEEE FORMAT, Rules of Floating point Arithmetic, parity, Error detection and correction methods using Hamming technique, ASCII code representation, Number systems & their inter - conversion rules, Rules of addition/subtraction for r 's, $(r - 1)$'s complements.

10 Hrs

UNIT - II

Logic gates, And, OR, NOT, NAND, XOR, NOR, XNOR Gates & their design.

Boolean Algebra: Binary arithmetic, Boolean Expressions, Laws of Boolean Algebra, De-Morgan laws, K - map, simplification of Boolean Expressions using SOP, POS,

K - map techniques.

10 Hrs

UNIT - III

Combinational circuits: Half & Full adders & subtractors, parallel adders and subtractors.

Encoder, decoder, Multiplexer, De - Multiplexer, code converters.

Sequential circuits: Flip-flop and its types, registers and their types, & bi - directional register.

10 Hrs

UNIT - IV

Memory organization: Memory Hierarchy, Memory, its types (RAM/ROM), characteristics of memory, memory address map to CPU, cache memory. I/O devices FD/HD disks, VDU; I/O organization: Modes of I/O transfer like DMA, programmed control, interrupts technique.

Interrupt & instruction: Interrupt, its types & its life cycle, instruction life cycle.

10 Hrs

Suggested Readings:

1. Gear, C.W., Computer Organization and Programming McGraw – Hill, 1975.
2. Tannenbaum, A.S., Structured Computer Organization Prentice - Hall of India.
3. Mano, M.M., Computer System Architecture, Prentice – Hall, of India, 1983.
4. Langholz, G., Grancioni, J. and Kandel, A.: Elements of Computer Organization, Prentice - Hall International, 1988.
5. Assembler Manual for the chosen machine.
6. Hayes, Computer Architecture and Organization, McGraw – Hill International Edition.
7. Sloan, M.E., Computer Hardware and Organization, 2nd Edn, Galgotia publ., Pvt. Ltd.
8. Floyd: Digital Fundamentals, 3rd edn, Universal bookstall, and pvt.ltd
9. R. K Gaur, Digital Electronics and microprocessor - Dhantpat Rai pub.

Instructions for paper setter for courses with BCA codes

The examination in each paper shall be of 3 hours duration. There shall be a total of nine questions of 16 marks each and the candidate has to answer five questions selecting one question from each unit. Question No.1 shall be a compulsory question.

The guidelines for paper setting are given below as:

- a. Q. No. 1 will be a compulsory question and shall consist of 4 sub-parts (each of 4 marks) distributed over the entire syllabus.
- b. The paper setter shall set other eight questions selecting two from each unit.

PRACTICALS (BASED ON above 2 courses)

Total Marks = 100

Duration of the Examination: 3 Hrs

In this course the students shall be exposed to various practical problems based on courses BCA-201 and BCA-202. The Teacher-in-Charge shall design 30-40 problems based on these courses. The students shall be required to systematically work out the solution of those problems and implement using relevant tool in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct at least three internal evaluation tests for awarding the students for internal assessment. The students shall also be required to maintain proper record of each practical in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on regular tests, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:-

External Examination = 50 marks

Internal Examination/Assessment = 50 marks

Breakup for internal assessment:

- Regular Tests = 30 marks (A Minimum of three test shall be conducted during the entire semester. The marks for each test shall be distributed uniformly.)

- Practical File = 10 marks
- Attendance = 10 marks

B.A./B.Sc. Computer Applications

This course shall be offered in BA/BSc programme alongwith other courses and combinations available for the students of BA/BSc programmes. Computer Application shall be one course alongwith other three courses which may be opted by the students as per the combinations offered by the University/College.

Semester – I

COMPUTER FUNDAMENTALS AND IT TOOLS

Total Marks = 100

Semester Exam. = 80

Int. Assessment = 20

Duration of the Examination: 3 Hrs

Unit – I

Computer and its characteristics, application of computers, digital and analog computer, Generation of computers, Storage devices: primary storage devices (RAM,ROM,PROM,EPROM,EEPROM) , secondary storage devices(Floppy disk, Hard disk, optical disk, magnetic tapes), Input and output devices (keyboard, mouse, light pen, joystick, scanner, monitor, printers, etc.)

10 HRS

Unit - II

Software and its types (System Software, Application Software, Firmware Softwares) Computer Languages and its types (Machine Language, Assembly Language, High Level Language: advantages and disadvantages of computer languages),Translators :Compiler, Linker, Interpreter .

Number system and its types, conversion from one base to another and vice versa, arithmetic operations, r's, (r - 1)'s complement methods.

10 HRS

Unit – III

Operating system and its functions, types of operating system (Single user, multi-user, multitasking, time sharing , distributed). Fundamental of DOS, internal and external commands.Windows fundamentals: Anatomy of windows, desktop elements, managing files and folders, installing softwares

10 HRS

Unit – IV

Word Processor and its features, Editing of Text, Find and Replace, Bullets and Numbering, Spell Checker, Grammar Checker, Auto Correct, Auto Complete, Auto Text, Header and footer, tables, mail merge, border and shading, page setup, printing.

Spread sheet and its features, Entering Information in Worksheet, Editing Cell Entry, Moving and Copying Data, deleting or Inserting Cells, Rows and Columns, Custom Numeric Formats, Using Formulas and functions, Creating charts.

Presentation Softwares and its uses, steps for creating PowerPoint Presentation, PowerPoint Views, Assigning Slide Transitions, Using Preset Animations, Hiding Slides, Slide Show, Controlling the Slide Show with a Keyboard, Setting Slide Show Timings

10 HRS

Suggested Readings:

8. P.K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications.
9. Alexix Leon, Mathewes Leon, Fundamentals of Information Technology,
10. Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
11. V. Rajaraman, Fundamentals of Computers,EEE.
12. Peter Nortan, Introduction to Computers, Tata Mcgraw Hill
13. Joyce Coax , Joan Preppernau,,Steve Lambert and Curtis Frye,2007 Microsoft Office System step by step, Microsoft Press
14. R.K. Taxali, PC Software for Windows

Instructions for paper setters

The examination in each paper shall be of 3 hours duration. There shall be a total of nine questions of 16 marks each and the candidate has to answer five questions selecting one question from each unit. Question No.1 shall be a compulsory question.

The guidelines for paper setting are given below as:

- a. Q. No. 1 will be a compulsory question and shall consist of 4 sub-parts (each of 4 marks) distributed over the entire syllabus.
- b. The paper setter shall set other eight questions selecting two from each unit.

PRACTICALS

Duration of Examination: 3 Hrs

No. of Credits = 6

Total Marks = 100

In this course the students shall be exposed to various practical problems based on course BSCA-101. The Teacher-in-Charge shall design 30-40 problems based on these courses. The students shall be required to systematically work out the solution of those problems and implement using relevant tool in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct atleast two internal evaluation tests for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on regular tests, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:-

External Examination = 50 marks

Internal Examination = 50 marks

- Regular Tests = 30 marks
- Practical File = 10 marks
- Attendance = 10 marks

Semester – II

TITLE: PROGRAMMING CONCEPTS USING C LANGUAGE

Total Marks = 100

Semester Exam. = 80

Int. Assessment = 20

Duration of Examination: 3 Hrs

Unit - I

Algorithm, Representation of Algorithm, Flowcharts, Flowchart Symbols, Flowchart Rules, Advantages and Limitations of Flowcharts, Pseudo Code

Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types,

Format of c program, Arithmetic ,Relational & Logical Operators, Assignment Operators, Increment & Decrement Operators, Operator Precedence & Associativity.

10 HRS

Unit - II

Formatted Input, Formatted Output, escape sequences, Simple if Statement, if..... else Statement, Nesting of if...else Statements, , Switch Statement, conditional Operator, goto Statement, loops, break and continue statement

10 HRS

Unit – III

Qualifiers, Storage classes, Pointers definition, Declaring Pointer Variables, using pointer variable, **Arrays: One**, Two and Multi Dimension Arrays, Initialization of one and two dimensional Arrays, Declaring and Initializing String Variables, String Handling Functions.

10 HRS

Unit - IV

Preprocessor directives, Function Definition, Function Calls (call by value & call by address method) Returning Value, Types of Functions, Recursion, Passing Arrays to Functions, Macros, Defining Structure, Declaring and Accessing Structure Variables, Structures and Unions.

10 HRS

Suggested Readings:

7. E. Balaguruswami, Programming in C, PHI
8. Gottfried. B, Theory and problems of Programming with C Language, Tata Mc Graw Hill.
9. Kenneth. A, C Problem Solving and Programming, PHI.
10. Dan Gookin, C Programming, Wiley Dreamtech.
11. Y. P. Kanetkar, Understanding Pointers In C, BPB Publications.
12. Shubhnandan S. Jamwal; Programming in C; Pearson Publications; 1e, 2014
13. H.M. Deitel and P.J. Deitel, C How to Program, PHI.

Instructions for paper setter for courses with BSCA codes

The examination in each paper shall be of 3 hours duration. There shall be a total of nine questions of 16 marks each and the candidate has to answer five questions selecting one question from each unit. Question No.1 shall be a compulsory question.

The guidelines for paper setting are given below as:

- a. Q. No. 1 will be a compulsory question and shall consist of 4 sub-parts (each of 4 marks) distributed over the entire syllabus.
- b. The paper setter shall set other eight questions selecting two from each unit.

PRACTICALS

Total Marks = 100

Duration of Examination: 3 Hrs

In this course the students shall be exposed to various practical problems based on course BSCA-201. The Teacher-in-Charge shall design 30-40 problems based on these courses. The students shall be required to systematically work out the solution of those problems and implement using relevant tool in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct atleast two internal evaluation tests for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on regular tests, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:-

External Examination = 50 marks

Internal Examination = 50 marks

- Regular Tests = 30 marks
- Practical File = 10 marks
- Attendance = 10 marks

Statistics

Semester-I

Total Marks = 100

Semester Exam. = 80

Int. Assessment = 20

Paper Title : DESCRIPTIVE STATISTICS AND PROBABILITY THEORY

Objectives: The Objectives of this course is to impart students the basic knowledge of measures of central tendencies and measure of dispersion along with the introduction to concept of probability and its basic theory.

Unit- I

Definitions, Scope and importance of statistics, General nature of statistical data, qualitative and quantitative data, discrete and continuous data, Primary and secondary data, classification & Tabulation, frequency distribution and their graphical and diagrammatic representations histogram, frequency curves, bar diagram, Ogive and measures of central tendency (A.M.,G.M.,H.M.) Median and mode, their merits and demerits.

Unit-II

Measures of Dispersion: Range. Inter Quartile range, Mean Deviation, Standard Deviation, Variance & Coefficient of Variation, Partition values, Moments (raw and central moments) up to order four. Effect of change of origin and scale on moments. Shephard's correction (without proof). Skewness and Kurtosis meaning and measures.

Unit-III

Bivariate data: Scatter Diagram, product moment correlation coefficient ,its properties and simple illustrations. Spearman's rank correlation coefficient, Intra class correlation coefficient & correlation ratio. Coefficient of determination.

Unit IV

Probability: Random experiment, events, algebra of events, sample space, definitions of Probability, simple illustrations for three events, conditional Probability, theorem on Probability of two events and its extension. Independent events, simple illustrations, Bayes Theorem and its applications.

Unit – V

Probability mass function and Probability density function, joint marginal and conditional pmf and pdf, Jacobian Transformation for one and two variables. Independence of random variables, Discrete and continuous random variables. Mathematical expectation, expectation of sum of two

random variables and product of two independent random variables, conditional expectation and conditional variance, moment generating function and properties of mgf.

Note for paper setting:

The question paper will contain three Sections. Section A will contain compulsory ten very short answer type questions of 1 mark each. Section B will contain 7 short answer type questions of 5 marks each atleast one question from each unit and the student has to attempt any five questions. Section C will contain 10 long answer type questions, two from each unit, of 9 marks each and the student has to attempt five questions selecting one from each unit.

Books Recommended

1. Gupta and Kapoor: Fundamentals of Mathematical Statistics
2. Kapoor and Saxena: Mathematical Statistics
3. Goon, Gupta and Dass Gupta; fundamentals of Statistics vol-I
4. S.P. Gupta; Statistical Methods
5. Croxton F.E., Cowden D.J. and Kelin S: Applied General Statistics, Prentice Hall of India
6. Mood, A.M. Boes, D.C. and Graybill, F.A.: Introduction to the Theory of Statistics.
7. . Parzen: Modern Probability Theory
8. M.N. M urthy: Theory of Probability.
9. V.K. Rohatgi; Introduction to the theory of Probability

Paper Title : Statistical Computing-I

Objectives: The objective of the course is to expose the students to the real life applications Statistical Tools.

There shall be atleast twenty computing exercises covering the applications of Statistics based on the entire syllabus of course STT 111.

Semester-II

Total Marks = 100

Semester Exam. = 80

Int. Assessment = 20

Paper Title : DESCRIPTIVE STATISTICS AND PROBABILITY DISTRIBUTIONS

Unit – I

Discrete Probability distributions: Uniform distribution, its mean and variance, Bernoulli distribution, binomial distribution, its mean, variance, mode and mgf, recurrence relation for B.D. Definition, moments and mgf. Negative binomial distribution, Poisson distribution and its moments. Poisson distribution as a limiting case of B.D., its mean, variance and mg, Recurrence relation of Poisson distribution, Poisson distribution as a limiting case of negative B.D. recurrence formula for N.B.D. Hyper geometric distribution; its definition, mean, variance and relation with Binomial distribution.

Unit – II

Rectangular distribution; Moments of rectangular distribution, mgf and mean deviation of rectangular distribution. Normal distribution: its definition, mean, variance and mgf. Properties of Normal curve, simple problems on Normal distribution including area problems, Normal distribution as a limiting case of binomial distribution, under the conditions to be stated. Mean deviation, Median and Mode of Normal distribution.

Unit –III

Gamma and Beta distribution: Definition and properties of Gamma distribution, beta distribution of first kind as well as of second kind, Exponential distribution along with simple illustrations.

Markov, Chebbychev and Jensens inequalities with proof and their simple illustrations.

Unit -IV

Regression lines, regression coefficient and their properties. Principle of least squares, fitting of a straight line, parabola, logarithmic and exponential curve by the method of least squares.

Multivariate Data: Multiple regression line, Partial and multiple correlation coefficients of three variables only (Derivations and simple illustrations).

Unit V

Scales of measurement of Data. Theory of Attributes: Notation and terminology for attributes, contingency table, class frequency, ultimate class frequency, relationship between class frequencies, consistency of data, conditions for consistency of data. Association and independence of attributes (upto three attributes)

Note for paper setting:

The question paper will contain three Sections. Section A will contain compulsory ten very short answer type questions of 1 mark each. Section B will contain 7 short answer type questions of 5 marks each atleast one question from each unit and the student has to attempt any five questions.

Section C will contain 10 long answer type questions, two from each unit, of 9 marks each and the student has to attempt five questions selecting one from each unit.

Books Recommended

1. Mood, A.M. , Boes, D.C. and Graybill, F.A.: Introduction to the theory of statistics.
2. Hogg. R.V. and Graig, A. T. : Introduction to the mathematical statistics.
3. Saxena, H.C.; Finite Mathematics.
4. Lindgren: Statistical Theory
5. Parzen: Modern Probability Theory
6. M.N. Murthy: Theory of Probability.
7. V.K. Rohatgi; Introduction to the theory of Probability

Paper Title : Statistical Computing-II

Objectives: The objective of the course is to expose the students to the real life applications Statistical Tools.

There shall be atleast twenty computing exercises covering the applications of Statistics based on the entire syllabus of course STT 121.

Applied Mathematics

Semester-I

Title of the Course:

Basic Mathematics

Semester Examination: 80 Marks

Sessional Assessment: 20 Marks

This is a basic course in Mathematics. The main purpose of this course is to make a sound background of the students so that they can take some advanced courses including application-oriented courses in Mathematical Sciences. The pre-requisite for this course is a good knowledge of High School Mathematics.

Unit-I Mathematical logic and set theory

Mathematical logic, Mathematical Sentences, Logical connectives (negation, conjunction, disjunction, implication and bi-implication) and their truth tables. Converse, inverse and contrapositive of statements. Tautology and contradiction, Equivalence of statements. Universal and existential quantifiers, Demorgan Laws, Exercises and examples based on these concepts. Sets, types of sets, family of sets, power set of the set. Venn Diagram, operation on sets (union, intersection, complement and symmetric difference of sets) and their properties. Demorgan Laws and their generalizations. Exercises and examples based on these concepts.

(13 lectures)

Unit-II Vectors in IR

Definition of a Vector, Equality of vectors, types of vectors, algebra of vectors, components of a vector. Linearly dependent and linearly independent vectors. Dot product and cross product of two vectors. Exercises and examples based on these concepts.

(12 lectures)

Unit-III Permutations and combinations

Fundamental principle of counting, the factorial notation, permutation and combination. Meaning of $P(n, r)$ and $C(n, r)$. Simple applications of permutations and combinations, Principle of Mathematical induction, Binomial theorem for rational index (statement only) and its simple applications, sequences and series, calculation of n th terms and sum of A.P, G.P. and H.P. series. Exercises and examples based on these concepts.

(12 lectures)

Unit-IV Trigonometry

Review of Basic trigonometric functions with the help of unit circle, Periodic functions, periodicity of trigonometric functions. Trigonometric functions of sum, difference, multiples and submultiples of angles. Conditional identities for angles of triangles. Graphs of trigonometric functions. Solutions of trigonometric equations (like $\sin x = \sin$ etc.). Sine and cosine formulae for triangles. Inverse trigonometric functions. Exercises and examples based on these concepts.

(12 lectures)

Unit-V Matrices and Determinants

Concept of a matrix, types of matrices, adjoint and inverse of a matrix. Solution of a system of equations in 2 or 3 variables using inverse of a matrix. Determinants. Properties of determinants. Applications of determinants in solving system of equations upto three variables having unique solutions. Exercises and examples based on these concepts.

(13 lectures)

Text Books:

1. Mathematics, Text Book for class XI published by NCERT.

2. Mathematics, Text Book for class XII published by NCERT.

Suggested Readings

Vector Algebra by Shanti Naryan.

NOTE:

1. Each lecture will be of one hour duration.
2. The question paper will contain two questions from each unit (total questions ten) and the candidates will be required to answer one question from each unit. Total questions to be attempted will be five i.e. there will be internal choice within each unit.

Semester-II

Title of the Course:

Co-ordinate Geometry and Calculus

Semester Examination: 80 Marks

Sessional Assessment: 20 Marks

This course is an introduction to the Geometry of the plane and the Calculus. It introduces the fundamental concepts which will enable the students to pursue careers of their choice. The pre-requisite for this course is sound knowledge of High School Mathematics.

Unit-I Co-ordinate Geometry

Distance formula, section formula, locus of a point, Area of a triangle. Equation of straight lines in various forms: Slope-intercept form, the point slope form, two point form, intercepts form, normal form and general form. Angle between two lines, conditions of perpendicularity and parallelism. Distance of a point from a straight line. Circle, Definition and equation of circle in various forms. Exercises and examples based on these concepts.

(13 lectures)

Unit-II Relations and functions

Concept of an ordered pair, Cartesian product of sets, Relation, Domain and Range of a relation, various types of relations, equivalence relation, Inverse of a relation, composition of two relations, partition of a set, Equivalence class. Fundamental theorem on Equivalence relation (without proof).

Definition of a function (in terms of a relation), various types of function. Graph of a function, composition of functions, inverse of a function. Exercises and examples based on these concepts.

(12 lectures)

Unit-III Limit, Continuity and Differentiability

Limit of a function, left hand and right hand limits. Basic properties of limits. Infinite limits. Continuous and discontinuous functions and their examples, operations on continuous functions. Definition of a Derivative. Derivative as rate of change. Derivative of some standard functions $\{(ax+b)^n, a^x, e^x, \log x, \text{trigonometric functions, inverse trigonometric functions}\}$ by first principle. Exercises and examples based on these concepts.

(12 lectures)

Unit-IV Successive Differentiability

Successive derivative, nth derivative of some standard functions, Leibnitz Theorem and its applications. Increasing and decreasing functions, maxima and minima and their simple applications. Exercises and examples based on these concepts.

(13 lectures)

Unit-V Integration

Integral as anti-derivative. Integration of some standard functions. Integration by substitution, Integration by parts. Integration through partial fractions. Fundamental Theorem of Integral Calculus (statement only), concept of definite integral, Fundamental properties of definite integral. Exercise and examples based on these concepts.

(12 lectures)

TEXT BOOKS:

1. Mathematics, Text Book for class XI published by NCERT.
2. Mathematics, Text Book for class XII published by NCERT.
3. The elements of Co-ordinate Geometry by S.L. Loney London MacMillan Co Ltd New York St. Martin's Press.

SUGGESTED READINGS

1. Differential calculus by Shanti Naryan.
2. Differential calculus by Dr. A. Aziz, S.D. Chopra and M.L. Kochar.
3. Co-ordinate Geometry by M.L. Kochar.
4. Text book of differential calculus by Prof. Khalil Ahmad published by Anamaya Publishers New Delhi 2004.

NOTE:

1. Each lecture will be of one hour duration.
2. The question paper will contain two questions from each unit (total questions ten) and the candidates will be required to answer one question from each unit. Total questions to be attempted will be five i.e. there will be internal choice within each unit.

Mathematics

Annexure A
Semester I

Calculus

Credits: 04
C.No : UGM 0101

Semester Examination: 80 Marks
Sessional Assessment: 20 Marks

Unit I

Function of two variables, their limit and continuity. Partial derivatives and Euler's theorem for homogeneous functions. Total derivatives and equality of $f_{xy}(x, y)$ and $f_{yx}(x, y)$. Double points, concavity, convexity and points of inflexion. (11 Lectures).

Unit II

Asymptotes in cartesian forms, Envelopes of one and two parameter family of curves, Indeterminate forms, L-Hospital's rule, Curve tracing in cartesian co-ordinates. (10 Lectures).

Unit III

Ordinary and partial derivatives of vector-valued functions, Directional derivatives of vector-valued functions of several variables, the operator ∇ , Gradient of scalar function, divergence and curl of vector functions, second order derivative of functions, the Laplacian operator ∇^2 , Line integral. (14 Lectures).

Unit IV

Polar co-ordinates and their relationship with cartesian co-ordinates, Angle between radius vector and tangent at a point on the curve and the angle of intersection of two curves, curve sketching in polar co-ordinates such as $r = a + b \cos \theta$, $a + b \sin \theta$, $a \cos n\theta$, $a \sin n\theta$, (for $n = 2$ and 3 only). (13 Lectures).

Unit V

Reduction formulae of $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int \cot^n x dx$, $\int \sec^n x dx$, $\int \operatorname{cosec}^n x dx$, $\int \sin^p x \cos^q x dx$. Rectification of plane curve in cartesian form only, Volume and surface of revolution of curves in cartesian form. (13 Lectures).

Text Books:

1. Differential Calculus by Shanti Narayan, Dr. P.K. Mittal, Pub. S.Chand.
2. Vector Calculus by Shanti Narayan, Dr. P.K. Mittal, Pub. S.Chand.
3. Integral calculus by Shanti Narayan and Dr. P.K. Mittal. Pub. S.Chand.

Note:

1. Each lecture will be of one hour duration.
2. The question paper shall consist of 10 questions, two questions from each unit. The candidate will be required to do five questions selecting exactly one question from each unit.

Dr. S. S. Singh

Semester II

Differential Equations and Three Dimensional Geometry

Credits: 04

Semester Examination: 80 Marks

C.No : UGM 0201

Sessional Assessment: 20 Marks

Unit I

Linear and Bernoulli's differential equations, Exact and non-exact differential equation, Differential equations solvable for p and Clairauts differential equation. Examples, problems based on these topics. (10 Lectures).

Unit II

Differential equations of 2^{nd} and 3^{rd} order with constant co-efficients of the type $f(D)y = g(x)$, where $g(x) = e^{ax}$, $\cos ax$, $\sin ax$, x^n , their sum and products in pair. Problems based on these topics. (10 Lectures).

Unit III

PDE of first order, linear equation of the form $pP + qQ = R$, Lagrange's method, Non-linear first order equations, Charpit's method, PDE's of 2^{nd} and 3^{rd} order with constant co-efficients, Homogeneous and Non-homogeneous partial differential equations. Examples and exercises based on these topics. (12 Lectures).

Unit IV

General equation of sphere, Sphere through four points, Plane section of a sphere, Intersection of two spheres, Sphere with a given diameter, Intersection of a sphere and a line, Equation of tangent plane at any point of the sphere, Angle of intersection of two spheres, condition for the orthogonality of two spheres. (13 Lectures).

Unit V

Equation of a cone with conic as guiding curve, enveloping cone of a sphere, condition that the given equation of 2^{nd} degree should represents a cone, intersection of a line with a cone, tangent plane to a cone at a point, condition for

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tangency for a plane, reciprocal cone, equation of a right circular cone, equation of cylinder, enveloping cylinder and equation of right circular cylinder. (15 Lectures).

Text Books:

1. Differential Calculus by Shanti Narayan and Dr. P.K. Mittal. Pub. S.Chand.
2. S.L. Ross, Differential equations, Blaidell, Pub. co. 1994.
3. Solid Geometry by Shanti Narayan, Dr. P.K. Mittal, Pub. S.Chand.

Note:

1. Each lecture will be of one hour duration.
2. The question paper shall consist of 10 questions, two questions from each unit. The candidate will be required to do five questions selecting exactly one question from each unit.

Dr. S. S. S.