Paper-I (ST-101)

Time: 3 Hours   M.M.:B. Sc: 40+10*
                                                                                         B.A: 28+7*
                                                                        * Internal Assessment

Statistical Methods-I

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-
 B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Introduction of Statistics : Origin, development, definition, scope, uses and limitations.

Types of Data : Qualitative and quantitative data, nominal and ordinal data, time series data, discrete and continuous data, frequency and non-frequency data.

Collection and Scrutiny of Data : Collection of primary and secondary data- its major sources including some government publications, scrutiny of data for internal consistency and detection of errors of recording, classification and tabulation of data.

UNIT-II

Presentation of Data : Frequency distribution and cumulative frequency distribution, diagrammatic and graphical presentation of data, construction of bar, pie diagrams, histograms, frequency polygon, frequency curve and ogives.

Measures of Central Tendency and Location : Arithmetic mean, median, mode, geometric mean, harmonic mean; partition values- quartiles, deciles, percentiles and their graphical location along with their properties, applications, merits and demerits.

UNIT-III

Measures of Dispersion : Concept of dispersion, characteristics for an ideal measure of dispersion. Absolute and relative measures based on: range, inter quartile range, quartile deviation, coefficient of quartile deviation, Mean deviation, coefficient of mean deviation, standard deviation (σ), coefficient of variation and properties of these measures.

Moments, Skewness and Kurtosis: Moments about mean and about any point and derivation of their relationships, effect of change of origin and scale on moments, Sheppard's correction for moments (without derivation), Charlier's checks; Coefficients of Skewness and Kurtosis with their interpretations.

UNIT-IV

Theory of Attributes : Symbolic notations, dichotomy of data, class frequencies, order of class frequencies, consistency of data, independence and association of attributes, Yule's coefficient of association and coefficient of colligation.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Applied Statistics	Neter J., Wasserman W., & Whitmore G.A.	Allyn & Bacon, Inc.
2.	Applied General Statistics	Croxton F.E., Cowden D.J. & Kelin S.	Prentice Hall
3.	Fundamental of Statistics Vol. I	Goon A.M., Gupta M.K., Dasgupta B.	World Press, Calcutta
4.	Statistics	Johnson R.	Wiley Publishers
5.	Basic Statistics	Aggarwal B.L.	New Age International
6.	Fundamentals of Mathematical Statistics	Gupta S.C.& Kapoor V.K.	Sultan Chand & Sons
7.	Programmed Statistics	Aggarwal B.L.	New Age International
8.	An Introduction To Theory of Statistics	G. Udny, Kendal M.G	Charles Griffin and co.

Paper-II (ST-102)

Time: 3 Hours   M.M.:B. Sc: 40+10*
                                                                                          B.A: 28+7*
                                                                          * Internal Assessment
Probability Theory

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-
 B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Concepts in Probability: Random experiment, trial, sample point, sample space, operation of events, exhaustive, equally likely and independent events; Definition of probability- classical, relative frequency, statistical and axiomatic approach.

UNIT-II

Conditional probability. Addition and multiplication laws of probability and their extension to n events. Boole's inequality; Baye' s theorem and its applications.

UNIT-III

Random Variable and Probability Functions: Definition of random variable, discrete and continuous random variable, probability function, probability mass function and probability density functions, distribution function and its properties, functions of random variables, joint, marginal and conditional probability distribution function.

Mathematical Expectation : Definition and its properties- moments, addition   and multiplication theorem of expectation. Conditional expectation and conditional variance.

UNIT-IV

Generating Functions: Moments generating function, cumulant generating function, probability generating function along with their properties.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Fundamentals of Mathematical Statistics	Gupta S.C.& Kapoor V.K.	Sultan Chand & Sons
2.	Probability for Statistical Decision Making	Edward P.J., Ford J.S. and Lin	Prentice Hall
3.	Elementary Probability	David S.	Oxford Press
4.	Introduction to Mathematical Statistics	Hoel P.G.	Asia Pub. House
5.	New Mathematical Statistics	Bansi Lal & Arora S.	Satya Prakashan
6.	Introduction to Mathematical Statistics	Hogg and Craig	Prentice Hall

Paper-I (ST-201)

Time: 3 Hours   M.M.:B. Sc: 40+10*
                                                                                                            B.A: 28+7*
                                                                                                  * Internal Assessment

Statistical Methods-II

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-
 B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Correlation : Concept and types of correlation, methods of finding correlation - scatter diagram, Karl Pearson's Coefficient of correlation (r), its properties, coefficient of correlation for a bivariate frequency distribution. Rank correlation with its derivation, its merits and demerits, limits of rank correlation coefficient, tied or repeated ranks.

UNIT-II

Curve Fitting : Principle of least squares, fitting of straight line, second degree parabola, power curves of the type $Y=aX^b$, exponential curves of the types $Y=ab^X$ and $Y=ae^{bX}$.

UNIT-III

Linear Regression : Two lines of regression, regression coefficients, properties of regression coefficients, angle between two regression lines, standard error of estimate obtained from regression line, correlation coefficient between observed and estimated values, distinction between correlation and regression.

UNIT-IV

Multiple Regressions for Three variables: Plane of regression, properties of residuals, variance of the residual. Multiple and partial correlation coefficients: coefficient of multiple correlation and its properties, coefficient of partial correlation and its properties, multiple correlation in terms of total and partial correlations coefficient of determination.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Introduction to Theory of Statistics	Mood A.M., Graybill F.A. & Boes D.C.	McGraw Hill
2.	Applied General Statistics	Croxton F.E., Cowden D.J. & Kelin S.	Prentice Hall
3.	Basic Statistical Computing	Cooke, Cramar & Clarke	Chapman & Hall
4.	Statistical Methods	Snedecor G.W. & Cochran W.G.	Lowa State Uni. Press
5.	Fundamentals of Mathematical Statistics	Gupta S.C.& Kapoor V.K.	Sultan Chand & Sons

Paper-II (ST-202)

Time: 3 Hours   M.M.:B. Sc: 40+10*
                                                                                                    B.A: 28+7*
                                                                                            * Internal Assessment

Probability Distributions

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-
 B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Bernoulli distribution and its moments, Binominal distribution: Moments, recurrence relation for the moments, mean deviation about mean, mode, moment generating function (m.g.f), additive property and recurrence relation for the probabilities of Binominal distribution.

UNIT-II

Poisson distribution: Poisson distribution as a limiting case of Binomial distribution, moments, mode, recurrence relation for moments, m.g.f., additive property of independent Poisson variates. Negative Binominal distribution: m.g.f., deduction of moments of negative binominal distribution from those of binominal distribution. Geometric distribution: moments and m.g.f.

UNIT-III

Continuous uniform distribution: Moments,   m.g.f.,   and mean deviation. Gamma distribution: m.g.f., and additive property. Exponential distribution: m.g.f., moments and lack of memory.

UNIT-IV

Normal distribution as a limiting form of binominal distribution, chief characteristics of Normal distribution; mode, median, m.g.f. and moments of Normal Distribution, A linear combination of independent normal variates, points of inflexion, mean deviation about mean, area property of Normal distribution, importance and fitting of normal distribution.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Statistics:A Beginner's Text Vol. II	Bhat B.R., Srivenkatramana T. & Rao Madhava K.S.	New Age International
2.	Fundamentals of Mathematical Statistics	Gupta S.C. & Kapoor V.K.	Sultan chand & Sons
3.	Introduction to Mathematical Statistics	Kapoor & Sexena.	Schand
4.	Statistics	Johnson R.	Wiley Publishers
5.	Mathematical Statistics With Applications	Freund's J.E.	Prentice Hall

Paper-III (Practical ST-203)

Time: 3 Hours   Max. Marks: B. Sc: 100

B.A: 60

Practical

Note: Five questions will be set. The candidate will be required to attempt
      any three.

1.   To construct frequency distributions using exclusive and inclusive methods
2.   Representation of data using Bar and pie diagrams
3.   Representation of data using Histogram, Frequency Polygon, Frequency Curve
      and Ogives.
4.   To toss a coin at least 100 times and plot a graph of heads with respect to
      number of tosses.
5.   To compute various measures of central tendency and dispersion.
6   To obtain first four moments for the given grouped frequency distribution.
7   To apply Charlier's checks while computing the moments for a given
      frequency distribution.
8.   To obtain moments applying Sheppard's correction.
9.   To obtain various coefficients of skewness and kurtosis.
10.   To discuss the association of attributes for a 2x2 contingency table using Yule's
      coefficient of association and colligation.
11.   To compute Karl Pearson's coefficient of correlation for given bivariate
      frequency distribution.
12.   To find Spearman's rank correlation coefficient for given data.
13.   To fit the straight line for the given data on pairs of observations.
14.   To fit the second degree curve for the given data.
15.   To fit the curve of the type $Y = aX^b$ for the given data on pairs of
      observations.

16.   To obtain the regression lines for given data.
19   To compute partial and multiple correlation coefficients for the given trivariate data.
20.   To obtain plain of regression for the given trivariate data. 21.   To fit binomial distribution to given data.
22.   To fit Poisson distribution to given data.
23.   To fit normal distribution to given distribution using area under the normal curve.
24.   To fit normal distribution to given distribution using method of ordinates.

Distribution of marks:

	B. Sc.	**B.A**
Class Record:	10	06
Viva Voce:	10	06
Practical:	80	48

B.Sc. I
English
Semester-I
Session 2011-12

SCHEME OF EXAMINATION

Max. Marks   50
End Semester Exam   40
Internal Assessment   10
Time: 3 Hours

Paper-A:

The Following text is prescribed for intensive study: **(20 marks)**

1. Following poems from *The Chronicles of Time* edited by Asha Kadyan (Oxford University Press)

   a) William Shakespeare
   "Let Me Not to the Marriage of True Minds"

   b) John Donne
   "Death Be Not Proud"

   c) John Milton
   "On His Blindness"

   d) Henry Vaughan
   "The Retreat"

   e) John Dryden
   "Shadwell"

   f) Alexander Pope
   "Know Then Thyself"

   g) William Blake
   "The Little Black Boy"

   h) William Wordsworth
   "Three Years She Grew in Sun and Shower"

   i) Percy B. Shelley
   "England in 1819"

   j) Alfred, Lord Tennyson
   "Crossing the Bar"

Part-B   **General English**   **20 marks**

1. Translation from Hindi to English   (4 marks)
   (Comprehension based on unseen passage for foreign/non-
   Hindi speaking candidates)
2. Paragraph Writing   (6 marks)

3. Common Phrasal Verbs, Prepositions & Common Errors in English   (10 marks)
Scheme of Question Paper

Note: The question paper will carry a maximum of 40 marks.

The paper will have seven questions as per details given below

Q. 1. The candidates will be asked to answer comprehension questions based on an
        extract from the text book. There will be internal choice.   (5 marks)

Q.2. The candidates will be asked to explain with reference to the context an extract from
      the text book. There will be internal choice.   (3 marks)

Q.3. There will be *four* short answer type questions based on the text book. The
      candidates will be asked to give answers in about 30 words each. There will be
      internal choice.
                                                              (2x3 = 6 marks)

Q.4. There will be *one* essay type question based on the text book with internal choice.
                                                                          (6 marks)

Q.5. Translation of a passage of about 10 sentences from Hindi to English (Non-Hindi
      speaking/foreign candidates will attempt a question of comprehension (with internal
      choice) based on an unseen passage in lieu of this question).   (4 marks)

Q.6. Paragraph (Candidates will be required to write about 250 words on any *one* out of
      the *five* given topics).   (6 marks)

Q.7. There will be *one* question with parts on the following items: common phrasal verbs,
      prepositions, common errors in English.   (10 marks)

B.Sc. I
English
Semester-II
Session 2011-12

SCHEME OF EXAMINATION

Max. Marks   50
End Semester Exam   40
Internal Assessment   10
Time: 3 Hours

Paper-A:

The following text is prescribed for intensive study: **20 marks**

1. Following essays from *Ideas Aglow* edited by Dinesh Kumar and V.B.Abrol (Publication Bureau, Kurukshetra University, Kurukshetra)

    a) C.E.M. Joad
       'Our Civilization'

    b) Jayant V. Narlikar
       'It's Question Time'

    c) N. Ram
       'An Interview with Christiaan Barnard'

    d) B.R. Ambedkar
       'Untouchability and the Caste System'

    e) Huck Gutman
       'Inhumanisation of War'

    f) Amartya Sen
       'Seven Types of Gender Inequality'

    Part-B: General English   **20 marks**

    1. Translation from English to Hindi   (5 marks)
       (Comprehension based on unseen passage for foreign/non-Hindi speaking candidates)

    2. Précis   (7 marks)

    3. Official Correspondence: Letter Writing   (8 marks)

Note: The question paper will carry a maximum of 40 marks.

The paper will have seven questions as per details given below

Q.1. The candidates will be asked to answer comprehension questions based on a passage from the text book. There will be internal choice.

                                           (5 marks)

Q.2. The candidates will be asked to explain with reference to the context a passage from the text book. There will be internal choice.

(3 marks)

Q.3. There will be *four* short-answer type questions based on the text book. The candidates will be asked to give answers in about 30 words each. There will be internal choice.

(2x3 = 6 marks)

Q.4. There will be *one* essay type questions based on the text book with internal choice.

(6 marks)

Q.5 Translation of a passage of about 10 sentences from English to Hindi (Non-Hindi speaking/foreign candidates will attempt a question of comprehension (with internal choice) based on an unseen passage in lieu of this question).

(5 marks)

Q.6. Précis: The candidates will be required to summarize a given passage in Contemporary English of about 250 words to one-third of its length and also give it a suitable heading.

(7 marks)

Q.7. The candidates will be asked to write an official letter. There will be internal choice.

(8 marks)

BM-111

(Semester-1)

Algebra

Note: Paper setter will set nine questions in all, selecting two questions from each section and one

Compulsory question consisting of five parts distributed over all four sections. Candidates are required

To attempt five questions, selecting at least one question from each section and the compulsory

Question.

Section-I

Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices. Elementary Operations on matrices. Rank of a matrices. Inverse of a matrix. Linear dependence and independence of rows and columns of matrices. Row rank and column rank of a matrix. Eigenvalues, eigenvectors and the characteristic equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix.

Section-II

Applications of matrices to a system of linear (both homogeneous and non– homogeneous) equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.

Section-III

Relations between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots. Common roots and multiple roots. Transformation of equations.

Section-IV

Nature of the roots of an equation Descarte's rule of signs. Solutions of cubic equations (Cardon's method). Biquadratic equations and their solutions.

REFERENCES

- H.S. Hall and S.R. Knight : Higher Algebra, H.M. Publications 1994.

- Shanti Narayan : A Text Books of Matrices.

- Chandrika Prasad : Text Book on Algebra and Theory of Equations. Pothishala Private Ltd., Allahabad.

BM-112

(Semester-1)

Calculus

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Definition of the limit of a function. Basic properties of limits, Continuous functions and classification of discontinuities. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

Section-II

Asymptotes in Cartesian coordinates, intersection of curve and its asymptotes, asymptotes in polar coordinates. Curvature, radius of curvature for Cartesian curves, parametric curves, polar curves. Newton's method. Radius of curvature for pedal curves. Tangential polar equations. Centre of curvature. Circle of curvature. Chord of curvature, evolutes. Tests for concavity and convexity. Points of inflexion. Multiple points. Cusps, nodes & conjugate points. Type of cusps.

Section-III

Tracing of curves in Cartesian, parametric and polar co-ordinates. Reduction formulae. Rectification, intrinsic equations of curve.

Section-IV

Quardrature (area)Sectorial area. Area bounded by closed curves. Volumes and surfaces of solids of revolution. Theorems of Pappu's and Guilden.

REFERENCES

- Differential and Integral Calculus : Shanti Narayan.

- Murray R. Spiegel : Theor y and Problems of Advanced Calculus. Schaun's Outline series. Schaum Publishing Co., New York.

- N. Piskunov : Differential and integral Calculus. Peace Publishers, Moscow.

- Gorakh Prasad : Differential Calculus. Pothishasla Pvt. Ltd., Allahabad.

- Gorakh Prasad : Integral Calculus. Pothishala Pvt. Ltd., Allahabad.

BM-113

(Semester-1)

Solid Geometry

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

General equation of second degree. Tracing of conics. Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic. System of conics. Confocal conics. Polar equation of a conic, tangent and normal to the conic.

Section-II

Sphere: Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, radical plane of two spheres. Co-oxal system of spheres Cones. Right circular cone, enveloping cone and reciprocal cone. Cylinder: Right circular cylinder and enveloping cylinder.

Section-III

Central Conicoids: Equation of tangent plane. Director sphere. Normal to the conicoids. Polar plane of a point. Enveloping cone of a coincoid. Enveloping cylinder of a coincoid

Section-IV

Paraboloids: Circular section, Plane sections of conicoids. Generating lines. Confocal conicoid. Reduction of second degree equations.

BM-121

(Semester-II)

Number Theory And Trigonometry

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: **Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.**

Section-I

Divisibility, G.C.D.(greatest common divisors), L.C.M.(least common multiple) Primes, Fundamental Theorem of Arithemetic. Linear Congruences, Fermat's theorem. Wilson's theorem and its converse. Linear Diophanatine equations in two variables

Section-II

Complete residue system and reduced residue system modulo m. Euler function Euler's generalization of Fermat's theorem. Chinese Remainder Theorem. Quadratic residues. Legendre symbols. Lemma of Gauss; Gauss reciprocity law. Greatest integer function [x]. The number of divisors and the sum of divisors of a natural number n (The functions d(n) and s (n)). Moebius function and Moebius inversion formula.

Section-III

De Moivre's Theorem and its Applications. Expansion of trigonometrical functions. Direct circular and hyperbolic functions and their properties.

Section-IV

Inverse circular and hyperbolic functions and their properties. Logarithm of a complex quantity. Gregory's series. Summation of Trigonometry series

REFERENCES

- S.L. Loney : Plane Trigonometry Part – II, Macmillan and Company, London.

- R.S. Verma and K.S. Sukla : Text Book on Trigonometry, Pothishala Pvt. Ltd. Allahabad.

- Ivan Ninen and H.S. Zuckerman. An Introduction to the Theory of Numbers.

BM-122

(Semester-II)

Ordinary Differential Equations

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one

Compulsory question consisting of five parts distributed over all four sections. Candidates are required

To attempt five questions, selecting at least one question from each section and the compulsory

Question.

Section-I

Geometrical meaning of a differential equation. Exact differential equations, integrating factors. First order higher degree equations solvable for x,y,p Lagrange's equations, Clairaut's equations. Equation reducible to Clairaut's form. Singular solutions.

Section-II

Orthogonal trajectories: in Cartesian coordinates and polar coordinates. Self orthogonal family of curves.. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous

Section-III

Linear differential equations of second order: Reduction to normal form. Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Method of variations of parameters. Method of undetermined coefficients.

Section-IV

Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators x (d/dx) or t (d/dt) etc. Simultaneous equation of the form dx/P = dy/Q = dz/R. Total differential equations. Condition for Pdx + Qdy +Rdz = 0 to be exact. General method of solving Pdx + Qdy + Rdz = 0 by taking one variable constant. Method of auxiliary equations.

REFERENCES

- D.A. Murray : Introductor y Course in Differential Equations. Orient Longaman (India) . 1967

- A.R.Forsyth : A Treatise on Differential Equations, Machmillan and Co. Ltd. London

- E.A. Codington : Introduction to Differential Equations.

- S.L.Ross: Differential Equations, John Wiley & Sons

- B.Rai & D.P. Chaudhary : Ordinary Differential Equations; Narosa, Publishing House Pvt. Ltd

BM-123

(Semester-II)

Vector Calculus

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: **Paper setter will set nine questions in all, selecting two questions from each section and one**

Compulsory question consisting of five parts distributed over all four sections. Candidates are required

To attempt five questions, selecting at least one question from each section and the compulsory

Question.

Section-I

Scalar and vector product of three vectors, product of four vectors. Reciprocal vectors. Vector differentiation Scalar Valued point functions, vector valued point functions, derivative along a curve, directional derivatives.

Section-II

Gradient of a scalar point function, geometrical interpretation of grad F , character of gradient as a point function. Divergence and curl of vector point function, characters of Div f and Curl f as point function, examples. Gradient, divergence and curl of sums and product and their related vector identities. Laplacian operator.

Section-III

Orthogonal curvilinear coordinates Conditions for orthogonality fundamental triad of mutually orthogonal unit vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinates, Cylindrical co-ordinates and Spherical coordinates

Section-IV

Vector integration; Line integral, Surface integral, Volume integral Theorems of Gauss, Green & Stokes and problems based on these theorems.

REFERENCES

- Murrary R. Spiegal : Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.

- Murrary R. Spiegal : Vector Analysis, Schaum Publisghing Company, New York.

- N. Saran and S.N. NIgam. Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.

- Shanti Narayna : A Text Book of Vector Calculus. S. Chand & Co., New Delhi.

PAPER I: Computer and Programming Fundamentals

Maximum Marks: 50   **External: 40**
Minimum Pass Marks: 18   **Internal: 10**
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT -I

Computer Fundamentals: Definition, Functional components of computer, characteristics & classification of computers, Applications of com puters in various fields.
Memory: Concept of primary & secondary memory, RAM, ROM, types of ROM, Cache memory, CPU Registers, flash memory, Secondary storage devices: Sequential & direct access devices viz. magnetic tape, magnetic disk, CD, DVD.

UNIT -II

Computer hardware & software: I/O devices, definition of software, relationship between hardware and software, types of software, motherboard, ports.
Overview of operating system: Definition, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system, examples of various operating systems.

UNIT -III

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.
Techniques of Problem Solving: Flowcharting, algorithms, pseudo code, decision table, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

UNIT -IV

Searching, Sorting, and Merging: Linear & Binary Searching, Bubble, Selection, and Insertion Sorting, Merging.
Computer Languages: Analogy with natural language, machine language, assembly language, high-level language, language translators, characteristics of a good programming language.

TEXT BOOKS
1. Sinha, P.K. &Sinha, Priti, Computer Fundamentals, BPB
2. Dromey, R.G., How to Solve it By Computer, PHI

REFERENCE BOOKS
1. Balagurusamy E, Computing Fundamentals and C Programming, Tata McGraw Hill.
2. Norton, Peter, Introduction to Computer, McGraw-Hill
3. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
4. Rajaraman, V., Fundamentals of Computers, PHI

PAPER-II   Logical Organization of Computers

Maximum Marks: 50   **External: 40**
Minimum Pass Marks: **Internal: 10**
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT - I

Information Representation: Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC.

UNIT - II

Binary Logic: Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

UNIT - III

Digital Logic: Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. Combinational Circuits: Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters.

UN IT IV

Sequential Logic: Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops. State table, state diagram. Flip-flop excitation tables
Shift registers : serial in parallel out and parallel in parallel out.. Designing counters – Asynchronous and Synchronous Binary Counters, Modulo-N Counters and Up-Down Counters

TEXT BOOKS
1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS

Physics- PH-101

B.Sc.-1 (Physics)
Semester – I

Paper – I: Classical Mechanics and Theory of Relativity

Max. Marks: 40
Internal Assessment: 10
Time: 3 hours

Note:-
1. Nine Questions will be set in total.

2. Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.

3.   Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.
4.   20% numerical problems are to be set.
5.   Use of scientific (non-programmable) calculator is allowed.

Unit 1: Basic concepts of Classical mechanics
Mechanics of single and system of particles, Conversion law of linear momentum,
Angular momentum and mechanical energy for a particle and a system of particles,
Centre of Mass and equation of motion, Constrained Motion.

Unit2: Generalized Notations
Degrees of freedom and Generalized coordinates, Transformation equations, Generalized
Displacement, Velocity, Acceleration, Momentum, Force and Potential, Hamilton's
variational principle, Lagrange's equation of motion from Hamilton's principle, Linear
Harmonic oscillator, Simple pendulum, Atwood's machine.

Unit 3: Theory of relativity
Frame of reference, limitation of Newton's law of motion, Inertial frame of reference,
Galilean transformation, Frame of reference with linear acceleration, Classical relativity-
Galilean invariance, Transformation equation for a frame of reference- inclined to an

inertial frame and Rotating frame of reference, Non-inertial frames-The accelerated frame
of reference and rotating frame of reference , Effect of centrifugal and coriolis
 forces due to Earth's rotation, Fundamental frame of reference, Michelson-
 Morley's experiment, concept of Einstein's relativity.

Unit 4: Applications of theory of relativity
 Special theory of relativity, Lorentz co-ordinate and physical significance of
Lorentz invariance, Length Contraction, Time Dilation, Twin Paradox, Velocity
addition theorem, Variation of mass with velocity, Mass energy equivalence,
Transformation of relativistic momentum and energy, relation between relativistic
momentum and energy, Mass, velocity, momentum and energy of zero rest mass.

Reference:
1. Classical Mechanics by H. Goldstien (2nd Edition).

2. Berkely Physics Course. Vol. 1. Mechanics by E.M.Purcell
3. Concepts of Modern Physics by Arthur Beiser

4. Mechanics by D.S. Mathur

Physics- PH-102

Paper – II: Electricity, Magnetism and Electromagnetic theory

Max. Marks: 40

Internal Assessment: 10

Time: 3 hours

Note:-

1. Nine Questions will be set in total.

2. Question number 1 will be compulsory and will be based on the conceptual

aspects of entire syllabus. This question may have five parts and the answer

should be in brief but not in Yes/ No.

3. Four more questions are to be attempted, selecting one question out of two

questions set from each unit. Each question may contain two or more parts. All questions

will carry equal marks.

4. 20% numerical problems are to be set.

5. Use of scientific (non-programmable) calculator is allowed.

Unit I: Vector background and Electric field

Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of

a vector and their physical significance, Flux of a vector field, Divergence and curl of a

vector and their physical significance, Gauss's divergence theorem, Stoke's theorem.

Derivation of electric field E from potential as gradient, Derivation of Laplace and

Poisson equations, Electric flux, Gauss's Law, Mechanical force of charged surface,

Energy per unit volume.

Unit 2: Magnetism

Magnetic induction, Magnetic flux, Solenoidal nature of vector field of induction,

properties of (i) , (ii) , Electronic theory of dia and paramagnetism,

Domain theory of ferromagnetism (Langevin's theory), Cycle of magnetization- hystresis loop (Energy dissipation, Hystresis loss and importance of Hystresis Curve)

Unit 3: Electromagnetism

Maxwell equations and their derivations, Displacement current, Vector and Scalar potentials, Boundary conditions at interface between two different media, Propagation of

electromagnetic wave (Basic idea, no derivation), Poynting vector and Poynting theorem.

Unit 4: A. C. Analysis

A.C. circuit analysis using complex variable with (a) Capacitance and Resistance (CR) (b) Resistance and Inductance (LR) (c) Capacitance and Inductance (LC) and (d) Capacitance, Inductance and Resistance (LCR), Series and parallel resonance circuit, Quality factor (sharpness of resonance).

Reference:

1. Electricity and Magnetism by Reitz and Milford (Prentice Hall of India).

2. Electricity and Magnetism by A.S. Mahajan and A.A. Rangwala (Tata McGrawHill)

B.Sc.-1(Physics)   **Semester – II**

Physics- PH-201

Paper –III: Properties of Matter and Kinetic Theory of Gases

Max. Marks: 40

Internal Assessment: 10

Time: 3 hours

Note:-

1. Nine Questions will be set in total

2. Question number 1 will be compulsory and will be based on the conceptual

aspects of entire syllabus. This question may have five parts and the answer

should be in brief but not in Yes/ No.

3. For more questions are to be attempted, selecting one question out of two

questions set from each unit. Each question may contain two or more parts

4. 20% numerical problems are to be set.

5. Use of scientific (non-programmable) calculator is allowed.

Unit I: Moment of inertia

Rotation of rigid body, Moment of inertial, Torque, angular momentum, Kinetic

Energy of rotation. Theorem of perpendicular and parallel axes (with proof), Moment of

inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and

solid bar of rectangular cross–section, Fly wheel, Moment of inertia of an irregular body,

Acceleration of a body rolling down on an inclined plane.

Unit 2: Elasticity

Elasticity, Stress and Strain, Hook's law, Elastic constant and their relations, Poisson's ratio, Torsion of cylinder and twisting couple, Determination of coefficient of modulus of rigidity for the material of wire by Maxwell's needle, Bending of beam (Bending moment and its magnitude), Cantilever and Centrally loaded beam, Determination of Young's modulus for the material of the beam and Elastic constants for the material of the wire by Searle's method.

Unit 3: Kinetic theory of gases-I

Assumption of Kinetic theory of gases, pressure of an ideal gas (with derivation), Kinetic interpretation of Temperature, Ideal Gas equation, Degree of freedom, Law of equipartition of energy and its application for specific heat of gases, Real gases, Vander wall's equation, Brownian motion(Qualitative)

Unit 4: Kinetic theory of gases-II

Maxwell's distribution of speed and velocities (derivation required), Experimental verification of Maxwell's law of speed distribution: most probable speed, average and r.m.s. speed, Mean free path, Transport of energy and momentum, Diffusion of gases.

Reference:1. Properties of Matter by D.S. Mathur.
2. Heat and Thermodynamics (5th Edition) by Mark W. Zermansky.

Paper – IV: Semiconductor Devices

Physics-PH-202

Max. Marks: 40

Internal Assessment: 10

Time: 3 Hours

Note:-

1.   Nine Questions will be set in total.

2.   Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.

3.   Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.

4.   20% numerical problems are to be set.

5.   Use of scientific (non-programmable) calculator is allowed.

Unit I: Semiconductors

Energy bands in solids, Intrinsic and extrinsic semiconductors, carrier mobility and electrical resistivity of semiconductors, Hall effect, p-n junction diode and their characteristics, Zener and Avalanche breakdown, Zener diode, Zener diode as a voltage regulator. Light emitting diodes (LED), Photoconduction in semiconductors, Photodiode, Solar Cell, p-n junction as a rectifier, half wave and full wave rectifiers (with derivation), filters (series inductor, shunt capacitance, L-section or choke, π and R.C. filter circuits).

Unit 2: Transistors

Junction transistors, Working of NPN and PNP transistors, Three configurations of transistor (C-B, C-E, C-C modes),Common base, common emitter and common collector characteristics of transistor, Constants of a transistor and their relation, Advantages and disadvantages of C-E configuration. D.C. load line .Transistor biasing; various methods of transistor biasing and stabilization.

Unit 3: Transistor Amplifiers

Amplifiers, Classification of amplifiers, common base and common emitter amplifiers, coupling of amplifiers, various methods of coupling, Resistance- Capacitance (RC) coupled amplifier (two stage, concept of band width, no derivation), Feedback in amplifiers, advantages of negative feedback, emitter follower, distortion in amplifiers.

Unit 4: Oscillators

Oscillators, Principle of oscillation, classification of oscillators, Condition for self sustained oscillation: Barkhausen criterion for oscillation, Tuned collector common emitter oscillator, Hartley oscillator, C.R.O. (Principle and Working).

Reference:

1.   Basic Electronics and Linear Circuits by N.N.Bhargava. D.C. Kulshreshtha and S.C.Gupta (TITI CHD).

2.   Solid State Electronics by J.P. Agarwal, Amit Agarwal (Pragati Prakashan Meerut).

3.   Electronics Fundamentals and Applications by J.D. Ryder (Prentice Hall India)

4.   Solid State Electronics by B.L.Theraja