SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

For

B.Sc. (MATHEMATICS)

FACULTY OF SCIENCE

B.Sc (MATHEMATICS)(3 yrs Programme)

First Year

Code No.	Subject	Internal Marks	External Marks	Total
BSMAT101	Algebra and Trigonometry	30	70	100
BSMAT102	Calculus	30	70	100
BSMAT103	Geometry and Vectors	30	70	100
BSMAT104	Fundamentals of IT	30	70	100
BSMAT105	English-I	30	70	100
BSMAT106	Hindi-I	30	70	100
BSMAT104-P	Fundamentals of IT Lab	20	30	50
	Total	**200**	**450**	**650**

Second Year

Code No.	Subject	Internal Marks	External Marks	Total
BSMAT201	Advanced-Calculus	30	70	100
BSMAT202	Differential-Equations	30	70	100
BSMAT203	Statics	30	70	100
BSMAT204	Environmental Science	30	70	100
BSMAT205	English –II	30	70	100
BSMAT206	Hindi-II	30	70	100
	Total	**180**	**420**	**600**

Third Year

Code No.	Subject	Internal Marks	External Marks	Total
BSMAT301	Abstract Algebra	30	70	100
BSMAT302	Analysis	30	70	100
BSMAT303	Statistics	30	70	100
BSMAT304	Metric Spaces	30	70	100
BSMAT305	Numerical Methods	30	70	100
BSMAT306	English-III	30	70	100
BSMAT307	Hindi-III	30	70	100
	Total	**210**	**490**	**700**

Year-1

BSMAT101 External Marks: 70
Internal Marks: 30

Algebra and Trigonometry

Unit-1

Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen sectors and the characteristic equation of a matrix cayley Hamilton theorem and its use in finding inverse of a matrix.

Unit-2

Applications of matrices to system of linear (both homogenous and non-homogeneous) equations. Theorems on consistency of a system of linear equations. Relations between the roots and coefficients of general polynomial equation in one variable . Transformation of equation. Descartes' rule of signs. Solution of cubic equations (Cardoon method)

Unit-3

Definition of a group with example and simple properties. Sub groups. Cyclic groups. Cosset decomposition. Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Homomorphism and and isomorphism . Normal subgroup. Quotient groups.

Unit-4

The fundamental theorem of homomorphism. Permutation groups. Even and odd permutations. The alternating groups An Cayely's theorem. Introduction to flings. Sub rings .integral domains and fields. Characteristics of a ring.

Unit-5

Demovire's theorem and its applications. Direct and inverse circular and hyperbolic functions .Logarithm of a complex quantity. Expansion of trigonometrically functions.

BSMAT102 External Marks: 70

Internal Marks: 30

Calculus

Unit-1

Successive differentiation . Leibnitz theorem. Malaren and Taylor series expansions Asymptotes.

Unit-2

Curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar co -ordinates.

Unit-3

Definite integrals Quadrature. Rectification. Volumes and surfaces of solids of revolution.

Unit-4

Linear equation and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable forx, t,p, Clairaut's form and singular solutions Geometrical meaning of a differential equation . Orthogonal trajectories.

Unit-5

Linear differential equations with constant coefficients . Homogeneous linear ordinary differential equations. Linear differential equations of second order. Transformation of the equation by changing the dependent variable / the independent variable. Method of variation of parameters ordinary simultaneous diffenential equations.

BSMAT103

External Marks: 70
Internal Marks: 30

Geometry and Vectors

Unit-1

2-D geometry – Cartesian coordinates and polar coordinates; distance formula; equations of lines and circles; intersection of lines.

Unit-2

Conics sections – general second-order equation in two variables (without "cross term"); canonical forms of ellipse, hyperbola and parabola.

Unit-3

Vectors – motivation: quantities having magnitude and direction, e.g. force, velocity, displacement, etc; vectors as directed line segments; vector algebra; orthogonal unit vectors; representation of vectors as number triples; scalar and vector products, with applications.

Unit-4

3-D geometry – equation of a line through two points or through a point in a given direction; intersection of lines; equation of a plane through three points or through a point with a given normal vector; intersection of a line and a plane.

BSMAT104 External Marks: 70
Internal Marks: 30

Fundamentals of IT

Objectives: **This is a basic paper for Commerce students to familiarize with computer and it's applications in the relevant fields and exposes them to other related papers of IT.**

UNIT – I

Introduction to Computers:

The evolution of computers - Computer Generation from First Generation to Fifth Generation, Classifications of Computers - Micro, Mini, Mainframe and Super Computers, Distributed Computer System, Parallel Computers.

Computer Hardware – Major Components of a Digital Computer, Block Diagram of Computer, Input-Output devices, Description of Computer Input Units, Output Units, CPU

Computer Memory - Memory Cell, Memory Organization, Read Only Memory, Serial Access Memory, Physical Devices Used to construct Memories, Magnetic Hard disk, floppy Disk Drives, Compact Disk Read Only Memory, Magnetic Tape Drives.

UNIT – II

Number System:

Decimal, Binary, Octal, Hexa-decimal. Conversion - Decimal to all other number systems, Binary to octal and Hexa Decimal, Addition of binary numbers, Binary subtraction, Use of complements to represent negative numbers, Conversion of a binary fraction to a decimal fraction and decimal to binary fraction, Binary Coded Decimal(BCD), ASCII Codes, EBCDIC codes, Gray codes, Unicodes.

Algorithm and Flowcharts:

Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples
Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples

UNIT – III

Computer Software:

System software, assemblers, compilers, interpreters, linkers Elementary , Operating System concepts, different types of operating systems, Application Software.
Introduction to MS Office (MS-Word, MS PowerPoint, MS-Excel)
Computer Programming and Languages: Algorithms, flow chart, decision tables, pseudo code, Low level languages and introduction to high level languages.

UNIT – IV

Data Communication and Computer Networks:

Data Transmission mode, Data transmission media, Digital and Analog Transmission
What is computer Network? Network types, Network Topologies, Communication Protocol, OSI Model

UNIT - V

The Internet:

Definition, Brief History, Network Types (LAN, WAN and MAN), Client and Servers, Intranet, Extranet. Basic Services, Email, File Transfer Protocol, Telnet, Usenet News, Terminologies related to Internet: Protocol, Domain name, IP address, URL, World Wide Web.
Overview of various services on Internet: E-mail, FTP, Telnet, Chat, Instant Messaging

Internet Search Tools: Gopher, Archie, World Wide Web.
WWW Browsers: Line Browsers, Graphical Browsers, Java Enabled Browsers.
Uses of the Internet: Internet Service Providers and Types of Internet Connection: Direct/Leased line Connection, Remote Dial up Connection, SLIP/PPP Connection

Text Books:

1. Alex Leon & Mathews Leon, "Fundamentals of Information Technology", LeonTechworld, 1999.
2. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004
3. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 1992.

Reference Books:

1. V. Raja Raman, "Introduction to Computers", PHI, 1998.
2. Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing House, 1999.

Norton Peter, "Introduction to computers", 4th Ed., TMH, 2001.

BSMAT105

External Marks: 70
Internal Marks: 30

English-I

Objective: The objective of this course is to familiarize students about the dynamics of business language and discourse.

Unit -I

Texts: (Any Five)

1. Nirendranath Chakrabarti, "Amalkanti". (From oxford Anthology of Modern Indian Poetry, eds. Dharwadkar and Ramanujan).
2. Toru Dutt, "Sita"
3. Jawaharlal Nehru, "Tryst with Destiny".
4. Mirza Ghalib, "Delhi in 1857".
5. C. Rajagopalachari, Preface to the Mahabharata.
6. Nibir K. Ghosh, "Spiritual Nationalism of Sri Aurobindo".
7. Madhumalati Adhikari, "The Heritage of Indian Culture".
8. Rabindranath Tagore, "Where the Mind is Without Fear".
9. Kabir, one song translated by Tagore.
10. M.K. Gandhi, extract from "Satyagraha".
11. R.K. Narayan, "Toasted English".
12. Ruskin Bond," The Old Lama".
13. Khushwant Singh, " The Portrait of a Lady".
14. Ashok Mahadevan and Sushan Shetty,"Discovering Babasaheb", Section on "Clash of Titans" (Reader's Digest, December 2006).

Unit -II

Comprehension of an unseen passage:

Questions should be objective/multiple choice, and should test (a) an understanding of the passage in question, and (b) a grasp of general language skills and issues with reference words and usage within the passage.

Unit -III Paragraph

Writing:

Based on expansion of an idea. Word Limit :100-150 words. Candidates to attempt any one of three alternative topics provided

Unit -IV

Basic language skills-Vocabulary:

Synonyms, antonyms, one- word suBSGEOitution for phrases, prefixes, suffixes and word -derivation. Making sentences with idioms and phrases, corrections of sentences with words likely to be confused. Questions should not repeat examples or exercises given in the textbook.

Unit -V

Basic language skills - Grammar and Usage:

Modals, linking device, tenses and prepositions. Verb forms and structures, gerunds, participles and infinitives, verbs followed by a preposition and phrasal verbs, articles and determiners, countable and uncountable nouns, adjectives and articles. Questions should not repeat the examples or exercises given in the textbooks.

BSMAT106

External Marks: 70
Internal Marks: 30

Hindi-I

आधार पाठ्यक्रम

प्रश्न पत्र - प्रथम

पाठ्य विषय

इकाई-1 पल्लवन, पत्राचार तथा अनुवाद एवं पारिभाषिक शब्दावली ।

इकाई-2 मुहावरे-लोकोक्तियाँ, शब्दशुद्धि, वाक्य शुद्धि, शब्द ज्ञान-पर्यायवाची, विलोम, अनेकार्थी, समश्रुत (समानोचरित) अनेक शब्दों के लिए एक शब्द ।

इकाई-3 देवनागरी लिपि की विशेषता, देवनागरी लिपि एवं वर्तनी का मानक रूप ।

इकाई-4 कम्प्यूटर में हिन्दी का अनुप्रयोग, हिन्दी में पदनाम ।

इकाई-5 हिन्दी अपठित, संक्षेपण, हिन्दी में संक्षिप्तीकरण ।

पाठ्य क्रम के लिए पुस्तकें -

1. भारतीयता के स्वर साधन धनंजय वर्मा - म. प्र. ग्रंथ अकादमी ।
2. नागरी लिपि और हिन्दी - अनंत चौधरी - ग्रंथ अकादमी पटना ।
3. कम्प्यूटर और हिन्दी - हरिमोहन - तक्षशिला प्रकाशन, दिल्ली ।

BSMAT104-P

External Marks: 30
Internal Marks: 20

Fundamentals of IT LAB

1. Text Manipulations
2. Usage of Numbering, Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Text Formatting
5. Picture Insertion and Alignment
6. Creation of Documents Using Templates`
7. Creation of Templates
8. Mail Merge Concept
9. Copying Text and Picture From Excel
10. Creation of Tables, Formatting Tables
11. Splitting the Screen
12. Opening Multiple Document, Inserting Symbols in Documents

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Aligning, Editing Data in Cell
3. Excel Function (Date, Time, Statistical, Mathematical, Financial Functions)
4. Changing of Column Width and Row Height (Column and Range of Column)
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Formatting Numbers and Other Numeric Formats
7. Drawing Borders Around Cells
8. Creation of Charts Raising Moving
9. Changing Chart Type
10. Controlling the Appearance of a Chart

MS -POWER POINT

Working With Slides

1. Creating, saving, closing presentation
2. Adding Headers and footers
3. Changing slide layout
4. Working fonts and bullets
5. Inserting Clip art: working with clipart,
6. Applying Transition and animation effects
7. Run and Slide Show

DOS

1. Basics of DOS
2. DOS (Internal & External Commands)
3. Use of Wild Card Character

Year-2

BSMAT201 External Marks: 70
Internal Marks: 30

Advanced-Calculus

Unit-I

Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequence. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests. Cauchy's integral tests. Ratio tests, Raabe's, logarithmic, de Morgan and Bertrand's tests.(without proofs) Alternating series, Leibnitz's theorem . Absolute and conditional convergence.

Unit-II

Continuity of single variables Sequential continuity. Properties of continuous functions. Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometricalinterpretations.Darboux'sintermediatevaluetheoremforderivatives.

Unit-III

Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables Jacobeans.

Unit-IV

Envelopes, Evolutes, Maxima, Minima and saddle point of functions of two variables. Lagrange multiplier method. Indeterminate forms.

Unit-V

Beta and Gamma functions. Double and triple integrals. Dirichlet's integrals, change of order of integration in double integrals.

BSMAT202 External Marks: 70
Internal Marks: 30

Differential-Equations

Unit-I

Series solutions of differential equations. Power series method. Bessel and Legendre. Functions and their properties-covergence, recurrence and generating relations. Orthogonality. Of functions. Sturm-Liouville problem. Orthogonality of eigen-functions. Reality of elgen values. Orthogonality of Bessel functions and Legend repolynomials

Unit-II

Laplace Transformation: Linearity of the Laplace transformation. Existence theorem for Laplace transforms. Laplace transformation of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations of differential using the Laplace transformation.

Unit-III

Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can solve easily by methods other than the general method. Char pit's general method of solution.

Unit-IV

Partial differential equation of second and higher orders. Classification of linear partial differential equations of second order. Homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficient . Monge's methods.

Unit-V

Calculus of Variations: Variation problems with fixed boundaries -Euler's equation for functional containing first order derivative and one independent variable. Externals. Functional dependent on higher order derivatives. Functional dependent on more than one independent variable. Variation problems in parametric in form. Invariance of Euler's equation under co-ordinates transformation.

Variation problems with Moving Boundaries : Functional son one and two functions. One sided riations. Sufficient conditions for an Extremum-Jacobi and Legendre conditions second variation. Variation principle of least action.

BSMAT203 External Marks: 70
Internal Marks: 30

Statics

Unit-I

Analytical conditions of equilibrium, Stable and unstable equilibrium, Virtual work, Catenary. Forces in three dimensions, Poinsot's central axis, Null lines and planes

Unit-II

Poinsot's central axis, Null lines and planes Stable and unstable equilibrium.

Unit-III

Dynamic

Simple harmonic motion, Elastic strings,Valocities and acceleration salongra dial and transverse directions, Projectile, Central orbits. Simple harmonic motion, Elastic strings. Kepler's laws of motion, Velocities and acceleration in tangential and directions.

Unit-IV

Motion on smooth and rough plane curves. Motion in a resisting medium. Motion of particles of varying mass.

Unit-V

Motion of particles of varying mass, Motion of a particle in three dimensions. Acceleration in terms of different co-ordinate systems. Central Orbits. Kepler's laws of motion. Motion of a particle in three dimensions.

BSMAT204 External Marks: 70
Internal Marks: 30

Environmental Science

Unit-1

Diversities of lifeforms- Concept of taxonomy, systematic and classification with respect to plant kingdom, animal kingdom and microbial world.

Unit-2

Fundamental of chemical equilibrium and reaction kinetics -Stochiometry, chemical equilibrium, thermodynamics application in reaction process (both chemical and biological process), acid base reaction, solubility products, bioinorganic complexes and their importance.

Unit-3

Radiation Physics-Electromagnetic radiation characteristics and its biological effects, radioactivity-source, characteristics, and impacts, radiation in diagnosis and therapy of diseases, radioisotopes and radionuclide in biological systems

Unit-4

Tropical monsoon-causes, and impacts, impacts of climate change on tropical monsoon

Unit-5

Noise Pollution- source of noise, distinction between sound and noise, noise impacts, noise monitoring and control strategies

REFERENCE

a) Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
b) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
c) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
d) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
e) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
f) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
g) Down to Earth, Centre for Science and Environment (R)
i) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
.k) Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
l) Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.

BSMAT205 External Marks: 70
Internal Marks: 30

English -II

Unit-I (Any Five)

1. Walt Whitman – O Captain! My Caption!
2. George Orwell – What is Science
3. J. Bronowski - The Dilemma of The Scientist
4. Will Durant – The Origin of Science
5. Somerset Maugham – The Luncheon
    - Henry The Last Leaf
6. Major Ancient Indian Scientist Adopted
7. C.P Snow- Ramanujan
8. Aldous Huxley – J.C.Bose
9. Human Rights
10. R.K Narayan – The Axe
11. Dr. C.V Raman - Water
12. Robert Frost – stopping by Woods on a Snow evening
13. Dr. Yashodhara Mishra – Understanding Gender issues.

Unit-II

Comprehension of an unseen passage question should be objective/Multiple - choice and should test (a) an understanding of the passage in question, and (b) a group of general language skills and issues with Reference Word and usage Within the passage.

Unit-III

Paragraph Writing: - Based on expansion word limit 100-150 words. Candidates to attempt any one of three alternative topics provided.

Unit-IV

Basic language Skill-Vocabulary Synonyms Antonyms one word Substitution of Phrases, Prefixes, Suffixes and word Derivation making Sentence With Idioms and Phrases Corrections of Sentence With Words Likely to be Confused Question Should not repeat the Examples Or exercises given in the text book

Unit-V

Basic language Skill- Grammar and Usage modals linking devices, tenses, and preposition verb forms Structures Gerunds Participles and infinitive, verbs followed by a preposition and phrasal verbs, articles and determines Countable and uncountable nouns adjectives, and adverbs. Questions Should not repeat the example exercise given in the text book

BSMAT206

External Marks: 70
Internal Marks: 30

Hindi -II

भाग - दो, आधार पाठ्यक्रम
(हिन्दी भाषा)

खण्ड-क निम्नलिखित 5 लेखकों के एक-एक निबंध पाठ्यक्रम में सम्मिलित होंगे -

1. महात्मा गांधी - सत्य और अहिंसा
2. विनोबा भावे - ग्राम सेवा
3. आचार्य नरेन्द्र देव - युवकों का समाज में स्थान
4. वासुदेव शरण अग्रवाल - मातृ-भूमि
5. भगवतशरण उपाध्याय - हिमालय की व्युत्पत्ति
6. हरि ठाकुर - डॉ. खूबचंद बघेल

खण्ड-ख हिन्दी भाषा और उसके विविध रूप

- कार्यालयीन भाषा
- मीडिया की भाषा
- वित्त एवं वाणिज्य की भाषा
- मशीनी भाषा

खण्ड-ग अनुवाद व्यवहार : अंग्रेजी से हिन्दी में अनुवाद

हिन्दी की व्यवहारिक कोटियाँ-

रचनागत प्रयोगगत उदाहरण, संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, समास, संधि एवं संक्षिसियां, रचना एवं प्रयोगगत विवेचन ।

Year-3

BSMAT301 External Marks: 70
Internal Marks: 30

ABSTRACT ALGEBRA

UNIT -I

Group-Auto orphisms, inner auto orphism. Auto orphism groups. Contumacy relation and centralizer. Normalize, Counting principle and the class equation of a finite group. Cauchy's theorem and Sylow's theorems for finite abeliart groups and non abelian groups.

UNIT -II

Ring theory-Ring homomorphism. Ideals and Quotient Rings. Field of Quotients of an Integral Domain. Euclidean Rings, Polynomial Rings, Polynomials over the Rational Field. Polynomial Rings over Commutative Rings. Unique factorization domain.

UNIT -III

Definition and examples of vector space. Sub space, Sum and direct sum of subspaces. Linear space. Linear dependence, independence and their basic properties. Basis Finite dimensional vector space. Existence theorem for bases, Invariance of the number of elements of a basis set. Dimension, Existence of complementary sub space of a sub space of a finite dimensional vector space. Dimension of sums of sub space, Quotient space and its dimension.

UNIT -IV

Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space, Bidual space and natural isomorphism. Ad joint of a linear transformation. Eigen values and eigenvectors of a linear transformation. Diagonalisation, Bilinear, Quadratic and Hermitical forms.

UNIT-V

Inner Product Spaces Cauchy-Schwarz inequality Orthogonal vectors. Orthogonal complements. Ortheornormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

BSMAT302

External Marks: 70
Internal Marks: 30

ANALYSIS

UNIT -I

Riemann integral, Inerrability of Continuous and monotonic functions fundamental theorem of integral calculus. Mean value theorems of integral calculus.

Partial derivation and differentiability of real-valued functions of two variables. Sehwarz Young's theorem. Implicit function theorem.

UNIT -II

Improper integrals and their convergence, Comparison tests. Abel's and Dirichlet's tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and inerrability of an integral function of a parameter.
Fourier series of half and full intervals.

UNIT -III

Complex numbers as ordered pairs. Geometric representation of complex numbers, Stereographic projection.
Continuity and differentiability of Complex functions. Analytic functions. Cauchy-Riemann equations. Harmonic functions.
Mobius transformations. Fixed points. Cross ratio. Inverse points and critic mappings. Conformal mappings.

UNIT -IV

Definition and examples and metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Sub space of a metric space. Cauchy sequences. Completeness. Cantor's intersection theorem. Contraction principle. Real numbers as a complete ordered field. Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces.

UNIT -V

Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets. Connectedness.

BSMAT303

External Marks: 70
Internal Marks: 30

STATISTICS

UNIT -I

Frequency distribution- Measures of central tendency, mean, median, mode, G.M., H.M., partition values, measures of dispersion- range, inter quartile range, mean deviation, standard deviation, moments, skewness and kurtosis.

UNIT -II

Probability- Event, sample space, probability of an event, addition and multiplication theorems, Baye's theorem, continuous probability-probability density function and its applications for finding the mean, mode, median and standard deviation of various continuous probability distributions. Mathematical expectation, expectation of sum and product of random variables, moment generating function.

UNIT -III

Theoretical distribution- Binomial, Poisson, normal, rectangular and exponential distributions, their properties and uses.

UNIT -IV

Methods of least squares, curve, fitting, correlation and regression, partial and multiple correlations (upto three variable only).

UNIT -V

Sampling - Sampling of large samples, Null and alternative hypothesis, Errors of first and second,, kinds,−level of significance. critical region, tests of significance based of $x^2\ t\ F$

BSMAT304

External Marks: 70
Internal Marks: 30

Metric Spaces

Unit I

Definition and examples of metric spaces, open spheres and closed spheres, Neighbourhood of a point, Open sets, Interior points, Limit points, Closed sets and closure of a set, Boundary points, diameter of a set, Subspace of a metric space.

Unit II

Convergent and Cauchy sequences, Complete metric space, Dense subsets and separable spaces, Nowhere dense sets, Continuous functions and their characterizations, Isometry and homeomorphism.

Unit III

Compact spaces, Sequential compactness and Bolzano-Weierstrass property, Finite Intersection property, Continuous functions and compact sets.

Unit IV

Disconnected and connected sets, Components, Continuous functions and connected sets.

Books Recommended:

1. G.F. Simmons: Introduction to Topology and Modern Analysis, McGraw Hill, 1963.

2. E.T. Copson, Metric spaces, Cambridge University Press, 1968.

3. P.K. Jain and Khalil Ahmad: Metric spaces, Second Edition, Narosa Publishing House, New Delhi, 2003.

4. B. K. Tyagi, first course in metric spaces, Cambridge University Press, 2010.

BSMAT305

External Marks: 70
Internal Marks: 30

Numerical Methods

Unit1

Solution of algebraic and transcendental equations: Bisection method, False position method, Fixed-point iteration method, Newton's method and its convergence, Chebyshev method. Solution of system of non-linear equations by Iteration and Newton-Raphson method. Program in C for Bisection method, False position method and Newton's method.

Unit 2

Finite difference operators and finite differences; Interpolation and interpolation formulae: Newton's forward and backward difference, Central difference: Sterling's and Bessel's formula, Lagrange's interpolation formula and Newton's divided difference interpolation formula, Hermite interpolation. Program in C for Newton's forward and backward formula, Newton's divided difference formula.

Unit 3

Direct methods to solve system of linear equations: Gauss elimination method, GaussJordan method, LU decomposition; Indirect methods: Gauss-Jacobi and Gauss-Seidal methods. The algebraic eigen value problems by Householder and Power method. Algorithms and program in C for Gauss-Jacobi and Gauss-Seidal method.

Unit 4

Numerical differentiation and Numerical integration by Newton cotes formulae, Trapezoidal rule, Simpson's rule, Romberg formula and their error estimation. Numerical solution of ordinary differential equations by Euler's method, Picard's method, Taylor series and Runge-Kutta methods. Program in C for Trapezoidal and Simpson's rule.

Books Recommended:

• B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India,2007

• M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New age International Publisher, India, 5th edition, 2007

• C. F. Gerald and P. O. Wheatley, Applied Numerical Analysis, Pearson Education, India,7th edition, 2008.

• M. Pal : Numerical Analysis for scientific and engineering computation, Narosa Publication

• N. Ahmad, Fundamental Numerical Analysis with error estimation, Anamaya Publisher..

BSMAT306

English -III

Unit-1 Essay type answers in about 200 words. Four essay types question to be asked and two be attempted.

Unit-2 Writing skills for composition- Essay writing.

Unit-3 Précis writing.

Unit-4 (a) reading comprehension of an unseen passages.

(b) Vocabularye based on text.

Unit-5 Grammar: Advanced Exercises.

Note- Question on unit I and IV (b) shall be asked from the prescribed text. Which will comprise of popular creative writings and the following items.
Minimum needs: Housing and transport, Geo-economic profile of C.G. of education and culture, Women empowerment , Management of change (Physical quality of life) . War and human survival. The question of human social value, new Economic philosophy recent liberalization methods democratic decentralization (with reference to 73, 74 constitutional amendment.)

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Hindi -III