Criterion 1 Curricular Aspects Metric

| Metric <br> No. | 1.2 Academic Flexibility |  |
| :--- | :--- | :--- |
| 1.2.1.1 | 1.2.1.1: Number of <br> Programmes in which CBCS <br> / Elective course system <br> implemented. | University syllabus for the courses having <br> Optional/ Elective courses |

## Bachelor of Commerce

B.COM. PART-III

SCHEME OF EXAMINATION

| Subject | Max. <br> Marks | Min. Marks |
| :---: | :---: | :---: |
| A. FOUNDATION COURSE- |  |  |
| (a) Hindi Language - | 75 | 26 |
| (b) English Language - | 75 | 26 |
| B. COMPULSORY CORE COURSE: |  |  |
| I. Income Tax | 75 | 25 |
| II. Indirect Tax | 75 | 25 |
| III. Management Accounting | 75 | 25 |
| IV. Auditing | 75 | 25 |
| And any one of the following Cantination Optional Group. OPTIONAL GROUP - A |  |  |
| I. Financial Management | 75 | 25 |
| II. Financial Market | 75 | 25 |
| OPTIONAL GROUP - B |  |  |
| Principal of Marketing | 75 | 25 |
| I. International Marketing | 75 | 25 |
| OPTIONAL GROUP - C |  |  |
| i. Information Technology and its |  |  |
| Applications in Business | 75 | 25 |
| ii. Essential of E-Commerce | 75 | 25 |
| OPTIONAL GROUP-D |  |  |
| i. Fundamentals of Insurance | 75 | 25 |
| ii. Money \& Banking System | 75 | 25 |

## USE OF CALCULATORS

The students of Degree/P.G. Classes will be permitted to use of Calculators in the examination hall from annual 1986 examination on the following conditions as per decision of the standing committee of the Academic Council at its meeting held on 31-1-1986.

1. Student will bring their own Calculators.

2 Calculators will not be provided by University or examination centres.
3 Calculators with, memory and following variables be permitted,,+- ,, , square reciprocal, exponentials, log squares, root, trigonometric functions viz, sine, cosine tangent etc. factorial summation, $\mathrm{xy}, \mathrm{yx}$ and in the light of objective approval of merits and demerits of the viva only will be allowed.

## REVISED ORDINANCE NO. 21

## BACHELOR OF SCIENCE

1. The three year course has been broken up into three Parts. Part-I known as B.Sc. Part-I examination at the end of the first year, Part-II known as B.Sc. Part-II examination at the end of the second year and Part-III known as B.Sc. Part-III examination at the end of the thirdyear.
2. A candidate who after passing (10+2) Higher Secondary or Intermediate examination of C.G. Board of Secondary Education Bhopal or any other Examination recognised by the University or C.G. Board of Secondary Education as equivalent thereto, has attended a regular course of study in an affiliated College or in the Teaching Department of the University for one academic year shall be eligible for appearing at the B.Sc. Part-Iexamination.
3. A candidate who, after passing the B.Sc.-I examination of the University or any other examination recognised by the University as equivalent thereto, has attended a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-IIexamination.
4. A candidate who, after passing the B.Sc. Part-Ii examination of the University, has completed a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-IIIexamination.
5. Besides regular students, subject to their compliance with this Ordinance exstudent and non-collegiate candidates shall be permitted to offer only such subjects/papers as are taught to the regular student at any of the University Teaching Department orCollege.
6. Every candidate appearing in B.Sc. Part-I, Part-II and Part-III examination shall be examined in-
(i) Foundation Course:
(ii) Any one of the following combinations of three subjects:-
7. Physics, Chemistry \&Mathematics.
8. Chemistry, Botany \&Zoology.
9. Chemistry, Physics \&Geology.
10. Chemistry, Botany \&Geology.
11. Chemistry, Zoology \&Geology.
12. Geology, Physics \&Mathematics.
13. Chemistry, Mathematics \&Geology.
14. Chemistry, Botany \& DefenceStudies.
15. Chemistry, Zoology \& DefenceStudies
16. Physics, Mathematics \& DefenceStudies.
17. Chemistry, Geology \& DefenceStudies
18. Physics, Mathematics \&Statistics
19. Physics, Chemistry \&Statistics
20. Chemistry, Mathematics \&Statistics.
21. Chemistry, Zoology \&Anthropology.
22. Chemistry, Botany \&Anthropology.
23. Chemistry, Geology \&Anthropology.
24. Chemistry, Mathematics \&Statistics.
25. Chemistry, Anthropology \& DefenceStudies.
26. Geology, Mathematics \&Statistics.
27. Mathematics, Defence Studies \&Statistics
28. Anthropology, Mathematics \&Statistics
29. Chemistry, Anthropology \& AppliedStatistics
30. Zoology, Botany \&Anthropology
31. Physics, Mathematics \&Electronics.
32. Physics, Mathematics \& ComputerApplication
33. Chemistry, Mathematics \& ComputerApplication
34. Chemistry, Bio-Chemistry \&Pharmacy
35. Chemistry, Zoology \&Fisheries.
36. Chemistry, Zoology \&Agriculture
37. Chemistry, Zoology \&Sericulture
38. Chemistry, Botany \& EnvironmentalBiology
39. Chemistry, Botany \&Microbiology
40. Chemistry, Zoology \&Microbiology
41. Chemistry, Industrial Chemistry \&Mathematics
42. Chemistry, Industrial Chemistry \&Zoology
43. Chemistry, Biochemistry,Botany
44. Chemistry, Biochemistry,Zoology
45. Chemistry, Biochemistry,Microbiology
46. Chemistry, Biotechnology,Botany
47. Chemistry, Biotechnology,Zoology
48. Geology, Chemistry \&Geography
49. Geology, Mathematics \&Geography
50. Mathematics, Physics \&Geography
51. Chemistry, Botany \&Geography
(iii) Practical in case prescribed for coresubjects.
52. Any candidate who has passed the B.Sc. examination of the University shall be allowed to present himself for examination in any of the additional subjects prescribed for the B.Sc. examination and not taken by him at the degree examination. Such candidate will have to first appear and pass the B.Sc. Part-I examination in the subjects which he proposes to offer and then the B.Sc. Part-II and Part-III examination in the same subject. Successful candidates will be given a certificate to thateffect.
53. In order to pass at any part of the three year degree course examination an examinee must obtain not less than $33 \%$ of the total marks in each subject/ group of subjects. In subject/ group of subjects where both theory and practical examination are provided an examinee must pass in both theory and practical parts of the examinationseparately.
54. Candidate will have to pass separately at the Part-I, Part-II and Part-III examinations. No division shall be assigned on the result of the Part-I and Part-II examination. In determining the division of the final examination, total marks obtained by the examinees in their Part-I, Part-II and Part-III examination in the aggregate shall be taken in to account. Provided in case of candidate who has passed the examination through supplementary examination having failed in one subject/ group only, the total aggregate marks being carried over for determining the division shall include actual marks obtained in the subject/ group in which he appeared at the supplementaryexamination.
55. Successful examinee at the Part-III examination obtaining $60 \%$ or more marks shall be places in the First Division, those obtaining less than $60 \%$ but not less than $45 \%$ marks in the Second Division and other successful examinees in the Third Division.

SCHEME OF EXAMINATION

| Subject | Paper | Max. <br> Mark | Total <br> Mark | Min. <br> Mark |
| :---: | :---: | :---: | :---: | :---: |
| (A) Compulsory Subject |  |  |  |  |
| 1) Hindi Language | I | 75 | - | 26 |
| 2) English Language | I | 75 | - | 26 |
| (B) Three Elective Subject : |  |  |  |  |
| 2. Chemistry | I | 33 |  |  |
|  | II | 33 | 100 | 33 |
|  | III | 34 |  |  |
|  | Practical |  | 50 | 17 |
| 1. Physics | I | 50 |  |  |
|  | II | 50 | 100 | 3 |
|  | Practical |  | 50 | 17 |
| 3. Mathematics | I | 50 |  |  |
|  | II | 50 | 150 | 50 |
|  | III | 50 |  |  |
| 4. Botany | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 5. Zoology | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 6. Geology | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 7. Statistics | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 8. Anthropology | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  |  | Practical | 50 | 17 |
| 9. Inde. chemistry | I | 34 |  |  |
|  | II | 33 | 100 | 33 |
|  | III | 33 |  |  |
|  | Practical |  | 50 | 17 |


| Subject | Paper | Max. Marks |  | Min. Marks |
| :---: | :---: | :---: | :---: | :---: |
| 10. Defence Studies | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 11. Micro Biology | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 12. Electronics | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 13. I.T. | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 14. Computer Science | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical |  | 50 | 17 |
| 15. Biochemistry | I | 50 |  |  |
|  | II | 50 | 100 | 33 |
|  | Practical | 50 |  |  |

## USE OF CALCULATORS

The Students of Degree/P.G. Classes will be permitted to use of Calculators in the examination hall from annual 1986 examnination on the following conditions as per decision of the standing committee of the Academic Council at its meeting held on 31-11986.

1. Student will bring their own Calculators.
2. Calculators will not be provided either by the University or examination centres.
3. Calculators with, memoty and following variables be permitted + ,,- x , square, reciprocal, expotentials log, square root, trignometric functions, wize, sine, cosine, tangent etc. factiorial summation, $\mathrm{xy}, \mathrm{yx}$ and in the light of objective approval of merits and demerits of the viva only will be allowed.

## MATHEMATIS

There shall be three theory papers. Two compulsory and one optional Each paper carrying 50 marks is divided into five units and each unit carry equal marks.

## PAPER - I (Paper Code-0898)

ANALYSIS

## REAL ANALYSIS

UNIT-I Series of arbitrary terms. Convergence, divergence and Oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real-valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Fourier series. Fourier expansion of piecewise monotonic functions.
UNIT-II Riemann integral. Intergrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus.
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 integrability of an integral of a function of a parameter.

## COMPLEX ANALYSIS

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. lementary functions. Mapping by elementary functions. Mobius transformations. Fixedpoints, Cross ratio. Inverse points and critical mappings. Conformal mappings.

## METRIC SPACES

UNIT-IV Definition and examples of metric spaces. Neighbourhoods, 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, Construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field.

UNIT-V Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity, Isometry and homeomorphism. Equivalent metrics. Compactness,Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets, Connectedness, Components, Continuous functions and connected sets.


## PART - II (Paper Code-0899)

## ABSTRACT ALGEBRA

UNIT-IGroup-Automorphisms, inner automorphism. Automorphism groups and their compu-tations, Conjugacy relation, Normaliser, Counting principle and the class equation of a finite group. Center for Group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow subgroup, Structure theorem for finite 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. The Eisenstien Criterion, Polynomial Rings over Commutative Rings, Unique factorization domain. R unique factorisation domain implies so is R [x1, x2 ..... xn] Modules, Submodules, Quotient modules, Homomorphism and Isomorphism theorems.

UNIT-III Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces, Linear span. Linear dependence, independence and their basic properties.
Basis. Finite dimensional vector spaces. Existence theoremfor bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space. Dimension of sums of subspaces. 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. Adjoint of a linear transformation. Eigenvalues and eigenvectors of a linear transformation. Diagonalisation. Annihilator of a subspace. Bilinear, Quadratic and Hermitian forms.

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


## PAPER - III - (OPTIONAL)

(I) PRINCIPLES OF COMPUTER SCIENCE (Paper Code-0900)

UNIT-IData Storage - Storage of bits. Main Memory. Mass Storage. Coding Information of Storage. The Binary System. Storing integers, storing fractions, communication errors. Data Manipulation - The Central Processing Unit. The Stored-Program Concept. Programme Execution. Other Architectures. Arithmetic/Logic Instructions. Computer-Peripheral Communication.

UNIT-II Operating System and Networks - The Evolutionof Operating System. Operating System Architecture. Coordinating the Machine's Activities. Handling Competition Among Process. Networks. Networks Protocol. Software Engineering - The Software Engineering Discipline. The Software Life Cycle. Modularity. Development Tools and Techniques. Documentation. Software Ownership and Liability.
UNIT-III Algorithms - The Concept of an Algorithm, Algorithm Representation. Algorithm

Discovery. Iterative Structures. Recursive Structures. Efficiency and Correctness.
(Algorithms to be implemented in C ).
Programming Languages - Historical Perspective. Traditional Programming Concepts, Program Units. Language Implementation. Parallel Computing. Declarative Computing.

UNIT-IV Data Structures - Arrays. Lists. Stacks. Queues. Trees. Customised Data Types. Object Oriented Programming.
File Structure - Sequential Files. Text Files. Indexed Files. Hashed Files. The Role of The Operating System.
Database Structure - General Issues. The Layered Approach to Database Implementation. The Relational Model. Object-Oriented Database. Maintaining Database Integrity. E-R models.
UNIT-V Artifical Intelligence - Some Philosophical Issues. Image Analysis. Reasoning, Control System Activities. Using Heuristics. Artificial Neural Networks. Application of Artificial Intelligence.
Theory of Computation - Turning Machines. Computable functions. A Non computable Function. Complexity and its Measures. Problem Classification.

## REFERENCES :

1. J. Glen Brookshear, Computer Science : An Overview, Addition -Wesley.
2. Stanley B. Lippman, Josee Lojoie, $\mathrm{C}^{++}$Primer (3rd Edition), Addison-Wesley.


## PAPER - III - (OPTIONAL)

## (II) DISCRETE MATHEMATICS (Paper Code-0901)

UNIT-ISets and Propositions - Cardinality. Mathematical Induction, Principle of Inclusion and exclusion.
Computability and Formal Languages - Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars and Languages. Permutations. Combinations and Discrete Probability.
UNIT-II Relations and Functions - Binary Relations, Equivalence Relations and Partitions. Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle. Graphs and Planar Graphs - Basic Terminology. Multigraphs. Weighted Graphs. Paths and Circuits. Shortest Paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planner Graphs. TREES.
UNIT-III Finite State Machines - Equivalent Machines. Finite State Machines as Language Recognizers. Analysis of Algorithms - Time Complexity. Complexity of Problems. Discrete Numeric Functions and Generating Functions.

UNIT-IV1 Recurrence Relations and Recursive Algorithms - Linear Recurrence Relations with Constant Coefficients. Homogeneous Solutions. Particular Solution. Total Solution. Solution by the Method of Generating Functions. Brief review of Groups and Rings.
UNIT-V Boolean Algebras - Lattices and Algebraic Structures. Duality, Distributive and Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Prepositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

## REFERENCES :

C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986.

PAPER - III - (OPTIONAL)
(III) APPLICATION OF MATHEMATICS IN FINANCE AND INSURANCE (Paper Code-0902)

## Application of Mathematics in Finance :

UNIT-I Financial Management - An overview. Nature and Scope of Financial Management.
Goals of Financial Management and main decisions of financial management. Difference between risk, speculation and gambling.
Time value of Money-Interest rate and discount rate. Present value and future valuediscrete case as well as continuous compounding case. Annuities and its kinds.

UNIT-II Meaning of return. Return as Internal Rate of Return (IRR). Numerical Methods like Newton RaphsonMethod to calculate IRR. Measurement of returns under uncertainty situations. Meaning of risk. Difference between risk and uncertainty. Types of risks. Measurement of risk. Calculation of security and Portfolio Risk and Return-Markowitz Model. Sharpe's Single Index Model Systematic Risk and Unsystematic Risk.

UNIT-III Taylor series and Bond Valuation. Calculation of Duration and Convexity of bonds. Financial Derivaties - Futures. Forward. Swaps and Options. Call and Put Option. Call and Put Parity Theorem. Pricing of contingent claims through Arbitrage and Arbitrage Theorem.

## Application of Mathematics in Insurance

UNIT-IV Insurance Fundamentals - Insurance defined. Meaning of loss. Chances of loss, peril, hazard, and proximate cause in insurance. Costs and benefits of insurance to the society and branches of insurance-life insurance and various types of general insurance. Insurable loss exposuresfeature of a loss that is ideal for insurance. Life Insurance Mathematics - Construction of Mortality Tables. Computation of Premium of Life Insurance for a fixed duration and for the whole life.
UNIT-V Determination of claims for General Insurance - Using Poisson Distribution and Negative Binomial Distribution-the Polya Case.
Determination of the amount of Claims in General Insurance - Compound Aggregate claim model and its properties, and claims of reinsurance. Calculation of a compound claim density function. F-recursive and approximate formulae for F .


PAPER - III - (OPTIONAL)
Theory component will have maximum marks 30.
Practical component will have maximum marks 20.

## (IV) PROGRAMMING IN C AND NUMERICAL ANALYSIS (Thoury \& Practical) (Paper Code-0903)

UNIT-IProgrammer's model of a computer. Algorithms. Flow Charts. Data Types. Arithmetic and input/output instructions. Decisions control structures. Decision statements. Logical and Conditional operators. Loop. Case control structures. Functions. Recursions. Preprocessors. Arrays. Puppetting of strings. Structures. Pointers. File formatting.

## Numerical Analysis

UNIT-II Solution of Equations : Bisection, Secant, Regula Falsi, Newton's Method, Roots of Polynomials : Interpolation : Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulasusing Differences. Numerical Differentiation. Numerical Quadrature : NewtonCote's Formulas. Gauss Quadrature Formulas, Chebychev's Formulas.

UNIT-III Linear Equations : Direct Methods for Solving. Systems of Linear Equations (Guass Elimination, LU Decomposition, Cholesky Decomposition), Iterative Methods (Jacobi, GaussSeidel, Relaxation Methods).
The Algebraic Eigenvalue problem : Jacobi's Method, Givens' Method, Householder's Method, Power Method, QR Method, Lanezos' Method.
UNIT-IV Ordinary Differential Equations : Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method, Methods Based on Numerical Integration, Methods Based on Numerical Differentiation, Boundary Value Problems, Eigenvalue Problems.
Approximation : Different Types of Approximation, Least Square Polynomial Approximation, Polynomial Approximation using Orthogonal Polynomials, Approximation with Trigonometric Functions, Exponential Functions, Chebychev Polynomials, Rational Functions.
Unit-V Monte Carlo Methods Random number generation, congruential generators, statistical tests of pseudo-random numbers.
Random variate generation, inverse tranform method, composition method, acceptancerejection method, generation of exponential, normal variates, binomial and Poisson variates.

Monte Carlo integration, hit or miss Monte Carlo integration, Monte Carlo integration for improper integrals, error analysis for Monte Carlo intergration.


## PAPER - III - (OPTIONAL) <br> (IV) PRACTICAL

## PROGRAMMING IN C AND NUMERICAL ANALYSIS

 LIST OF PRACTICAL TO BE CONDUCTED...1. Write a program in C to find out the largest number of three integer numbers.
2. Write a program in C to accept monthly salary from the user, find and display income tax with the help of following rules :

Monthly Salary
9000 or more
7500 or more
7499 or less

Income Tax
$40 \%$ of monthly salary
$30 \%$ of monthly salary
$20 \%$ of monthly salary
3. Write a program in C that reads a year and determine whether it is a leap year or not.
4. Write a program in C to calculate and print the first n terms of fibonacci series using looping statement.
5. Write a program in C that reads in a number and single digit. It determines whether the first number contains the digit or not.
6. Write a program in C to computes the roots of a quadratic equation using case statement.
7. Write a program in C to find out the largest number of four numbers using function.
8. Write a program in C to find the sum of all the digits of a given number using recursion.
9. Write a program in C to calculate the factorial of a given number using recursion.
10. Write a program in C to calculate and print the multiplication of given 2D matrices.
11. Write a program in C to check that whether given string palindrome or not.
12. Write a C function seriessum () to calculate the sum of series $: 1+X+1 / 2!X^{2}+1 / 3!X^{3}+\ldots . . . . .1 / n!X^{n}$
13. Write a program in C to determine the grade of all students in the class using Structure. Where structure having following members - name, age, roll, sub 1, sub2, sub3, sub4 and total.
14. Write a program in C to copy one string to another using pointers. (Without using standard library functions).
15. Write a program in C to store the data of five students permanently in a data file using file handling.


PAPER - III - (OPTIONAL)
(V) MATHEMATICAL MODELLING (Paper Code-0904) The Process of Applied mathematics.
UNIT-I Setting up first-order differential equations - Qualitative solution sketching. Difference and differential equation growth models.
UNIT-II Single-species population models. Population growth-An age structure model. The spread of Technological innovation.
UNIT-III Higher-order linear models- A model for the detection of diabetes. Combat modes.
Traffic models - Car-following models. Equilibrium speed distributions.
UNIT-IV Nonlinear population growth models. Prey-Predator models. Epidemic growth models. Models from political science - Proportional representationcumulative voting, comparison voting.
UNIT-V Applications in Ecological and Environmental subject areas- Urban waste water management planning.

## REFERENCES :

1. Differential equation models, Eds. Martin Braun, C.S. Coleman, D.A. Drew.
2. Political and Related Models, Steven. J. Brams, W.F. Lucas, P.D. Straftin (Eds.)
3. Discrete and System models, W.F. Lucas, F.S. Roberts, R.M. Thrall.
4. Life Science Models, H.M. Roberts \& M. Thompson.

All volumes published as modules in applied Mathematics, Springer-Verlag, 1982.
5. Mathematical Modelling by J.N. Kapur, New Age International, New Delhi.

## B. Ed. Curriculum

## Curriculum Framework

B.ED. TWO YEAR COURSE (2017-2019)

| Curriculum Organization based on NCTE framework |  |  |  |
| :---: | :---: | :---: | :---: |
| Semester I | Semester II | Semester III | Semester IV |
| THEORY | THEORY | THEORY | THEORY |
| (C) Philosophical Perspectives of Education (4 credits) | ( C ) Sociological Perspectives of Education (4 credits) | ( S ) Pedagogy - II (4 credits) | ( C S ) Gender, School \& Society (4 credits) |
| ( C ) Learner \& Learning Process (4 credits) | ( C ) Curriculum \& Knowledge (4 credits) | ( T E ) Assessment in Learning ( 2 credits) | ( T E ) Language Proficiency (4 credits) |
| -- | ( E Elective - I (4 credits) | -- | ( E ) Elective - II (4 credits) |
| ( S ) Pedagogy - 1 (4 credits) | ( T E ) Arts Education (2 credits) | -- | -- |
| PRACTICUM | PRACTICUM | PRACTICUM | PRACTICUM |
| Preparation of Teaching Aids ( 2 credits) <br> Community Activities <br> ( 2 credits) | Internship (4 Wks) (4 credits) School Experience - I (2 credits) <br> a) Observation Report of School Documents <br> b) Mentor's Report | Internship (16 Wks) (10 credits) <br> Reflective Diary (2 credits) <br> Supervisor's Assessment (2 credits)  | Psycho-metric Assessment ( 2 credits) <br> Viva-Voce on Teaching Experience |
| 12+4 = 16 Credits | 14+6=20 Credits | $6+14=20$ Credits | $12+2$ = 14 Credits |
| C = Core Paper; E = Elective Paper; T E = Teacher Enrichment; C S = Contemporary Study |  |  |  |



## B. Ed. Scheme

SCHEME OF ASSESSMENT
B.Ed. Two Year Course (Session 2017-19)

| SL. NO. | PAPER |  |  |  | SCHEME OF MARKS |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SEMESTER I | THEORY |  |  |  | EXTERNAL MARKS |  | INTERN | AL MARKS |
| Paper I | Philosophical Perspectives of Education |  |  |  | 100 |  |  | -- |
| Paper II | Learner and Learning Process |  |  |  | 100 |  |  | -- |
| Paper III | Pedagogy - I |  |  |  | 100 |  |  | -- |
|  | PRACTICUM |  |  |  | EXTERNA | L MARKS | INTERN | AL MARKS |
| (i) | Preparation of Teaching aids |  |  |  |  |  |  | 50 |
| (ii) | Community Activities |  |  |  |  |  |  | 50 |
|  | TOTAL |  |  |  | 30 | 0 |  | 100 |
| SEMESTER II | THEORY |  |  |  | EXTERNA | L MARKS | INTERN | AL MARKS |
| Paper IV | Sociological Perspectives of Education |  |  |  |  | 0 |  | -- |
| Paper V | Curriculum and Knowledge |  |  |  |  | 0 |  | -- |
| Paper VI | Elective - I |  |  |  |  | 0 |  | -- |
| Paper VII | Arts Education |  |  |  | 10 | 0 |  | -- |
|  | PRACTICUM |  |  |  | EXTERNA | L MARKS | INTERN | L MARKS |
| (i) | Internship (One month) School Experience - a) Observation of School Document; b) Mentor's Report |  |  |  |  |  |  | 50 |
|  |  |  |  | TOTAL | 400 | 0 |  | 50 |
| SEMESTER III | THEORY |  |  |  | EXTERNA | L MARKS | INTERN | AL MARKS |
| Paper VIII | Pedagogy - II |  |  |  |  | 0 |  | -- |
| Paper IX | Assessment in Learning |  |  |  |  | 0 |  | -- |
|  | PRACTICUM |  |  |  | EXTERNA | L MARKS | INTERN | AL MARKS |
|  | Internship ( 4 months ) |  |  |  |  |  |  | 100 |
|  | Reflective Diary \& Supervisor's Assessment |  |  |  |  |  |  | 50 |
|  |  |  |  | TOTAL |  | 0 |  | 150 |
| SEMESTER IV | THEORY |  |  |  | EXTERNA | L MARKS | INTERN | AL MARKS |
| Paper X | Gender, School and Society |  |  |  | 10 | 0 |  | -- |
| Paper XI | Language Proficiency |  |  |  |  | 0 |  | -- |
| Paper XII | Elective - II |  |  |  | 10 | 0 |  | -- |
|  | PRACTICUM |  |  |  | EXTERNA | L MARKS | INTERN | AL MARKS |
| (i) | Training in Yoga, Sports \& Games |  |  |  |  | - |  | 50 |
| (ii) | Psycho-metric Assessment |  |  |  | 5 | 0 |  | -- |
| (iii) | Viva-Voce on Teaching Experience |  |  |  | 100 |  |  | -- |
|  | TOTAL |  |  |  | 450 |  | 50 |  |
| SEMESTER | II |  |  |  | III |  | IV |  |
| EXAM | THEORY | PRACTICUM | THEORY | PRACTICUM | M THEORY | PRACTICUM | THEORY | PRACTICUM |
| MARKS | 300 | 100 | 400 |  | 200 | 150 | 300 | 200 |
| TOTAL MARKS | 400 450 |  |  |  | 350 |  | 500 |  |
|  | THEORY (SEM-I,II,III,IV) |  |  |  | PRACTICUM (SEM-I,II,III,IV) |  |  |  |
| TOTAL MARKS | 1200 |  |  |  | 500 |  |  |  |
| GRAND TOTAL | 1700 |  |  |  |  |  |  |  |

## Master of Commerce

M. Com. IV ${ }^{\text {th }}$ Semester

Special attention to the Students. Students are required to select any one Specialization out of four suggested below.

Optional - Specialization

```
Optional Group - (A) Marketing
Optional Group - (B) Management
Optional Group - (C) Banking and Insurance
Optional Group - (D) Taxation and
    Accounting
Optional Group - (A) विपणन (Marketing)
```

| प्रश्न पत्र | प्रश्नपत्र का नाम | पूर्णांक | पेपर कोड |
| :---: | :--- | :---: | :---: |
| Paper - A I <br> प्रश्न पत्र- A I | विपणन के सिद्धान्त <br> (Principle of Marketing) | $80+20$ | 401 |
| Paper - A II <br> प्रश्न पत्र - A II <br> विज्ञापन एवं विक्रय प्रबन्ध <br> (Advertising \& Sales Management) | $80+20$ | 402 |  |
| Paper - A III <br> प्रश्न पत्र- A III | विपणन अनुसन्धान <br> (Marketing Research) | $80+20$ | 403 |
| Paper - A IV <br> प्रश्न पत्र -A IV | अन्तर्राष्ट्रीय विपणन <br> (International Marketing) | $80+20$ | 404 |



## Master of Education <br> Curriculum Framework

## M.ED. TWO YEAR COURSE 2019-2020

Curriculum Organization based on NCTE framework

| Semester I | PEC | Semester II | P | Semester III | P | Semester IV | PEC |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (C) <br> Philosophical perspectives of Education (4 credits) | Strengthening language proficiency (4 credits) | ( C) Introduction to Research methodology in Education (4 credits) | Proposal presentation on Dissertation (2 Credits) | (C) <br> History and Development of Education in India (4 credits) | Psycho-metric Testing <br> (4 Credits) | (C) Curriculum Development (4Credits) | Academic Writing (2 Credits) |
| (C) <br> Sociological perspectives of Education (4 credits) |  | (C) <br> Psychological perspectives of Education (4 credits) | Internship School based Activities (4 Credits) | ( C) <br>  <br> Political <br> perspectives of Education <br> (4 credits) |  | (S)Educational <br>  <br> Counselling / <br> Education for differently abled (4Credits) |  |
| (E) <br> Education <br> Technology / <br> Teacher <br> Education <br> (4 credits) | Exploring library resources <br> (4 Credits) | (S) <br> Educational <br>  <br> Counselling <br> (4 Credits)/ <br> Education for <br> differently abled <br> (4 credits) |  | (E) <br> Advanced <br> Education <br> Statistics / <br> Educational <br> Administration and Management (4 credits) |  | Dissertation \& Viva-Voce <br> (8 Credits) |  |
|  |  |  |  | ( C) Gender perspectives in Education (4 Credits) |  |  |  |
| 12 | 8 | 12 | 6 | 16 | 4 | 16 | 2 |
|  | 20 |  | 18 | 20 |  |  |  |
| C = Core paper, E = Elective paper, S = Specialization, PEC = Professional Enhancement Course, P = Practicum |  |  |  |  |  |  |  |

## SCHEME OF TEACHING AND EXAMINATIONS MASTER OF SCIENCE IN COMPUTER SCIENCE

FORTH SEMESTER

| Subject Code | SUBJECTS | Teaching Load Per Week |  |  | Credit <br> L+ $(T+P) / 2$ | Examination Marks |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Max. Marks | Min. Marks |  |  |  |
|  |  | L | T | $\mathbf{P}$ |  | Th | Ses | Pr | Total | Th | Ses | Pr | Total |
| Paper 1 | Software Engineering | 3 | 2 | - |  | 4 | 100 | 50 | - | 150 | 40 | 30 |  | 70 |
| Paper II | Artificial intelligence and Expert System | 3 | 2 | - | 4 | 100 | 50 | - | 150 | 40 | 30 |  | 70 |
| Paper III | Elective : <br> 1. Data Mining \& Data Warehousing <br> 2. Advanced Computer Architecture | 3 | 2 | - | 4 | 100 | 50 | - | 150 | 40 | 30 |  | 70 |
| Project | Major Project | - | - | 6x2 | 6 | - | 50 | 300 | 350 |  | 30 | 150 | 180 |
| TOTAL |  | 09 | 06 | 15 | 18 | 300 | 200 | 300 | 800 | 120 | 120 | 150 | 390 |



## Master of Science (Mathematics)

## M.A./M.Sc. (MATHEMATICS) (Semester-III) 2018-19 \& Onward

There shall be five theory papers. Two compulsory and three optionals. Each paper shall have 100 marks. Out of these five papers, the paper which has theory and practical both, the theory part shall have 70 marks and practical part shall have 30 marks. Overall tally of marks in theory and practical will be 500 .

| Paper |  | Description | Theory | Sessional | Practical | Remark |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Compulsory Papers |  |  |  |  |  |  |
| I | Integration Theory and Functional Analysis (I) |  | 80 | 20 | -- | -- |
| II | Partial Differential Equations \& Mechanics (I) |  | 80 | 20 | -- | -- |
| Optional Papers |  |  |  |  |  |  |
| III | A | Fundamentals of Computer Science ( Object Oriented Programming and Data Structure) | 70 | -- | 30 | For regular students only |
|  | B | General Relativity and Cosmology (I) | 80 | 20 | -- | -- |
|  | C | Fuzzy Set Theory \& Its Applications (I) | 80 | 20 | -- | -- |
|  | D | Mathematical Biology (I) | 80 | 20 | -- | -- |
| IV | A | Operations Research (I) | 80 | 20 | -- | -- |
|  | B | Wavelets (I) | 80 | 20 | -- | -- |
| V | A | Programming in C (with ANSI Features) (I) | 70 | -- | 30 | For regular students only |
|  | B | Graph Theory (I) | 80 | 20 | -- | -- |
|  | C | Algebraic Number Theory (I) | 80 | 20 | -- | -- |

## Scheme of Examination

 M.A./M.Sc. (MATHEMATICS) (Semester-IV)
## 2018-19 \& Onward

There shall be five papers. Two compulsory and three optional papers. Each paper shall have 100 marks. The paper which has theory and practical both, the theory part shall have 70 marks and practical part shall have 30 marks. Overall tally of marks in theory and practical will be 500.

| Paper |  | Descri ption | Theory | Session al | Practical | $\begin{aligned} & \text { Rema } \\ & \text { rk } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Compulsory Papers |  |  |  |  |  |  |
| I | Functional Analysis (II) |  | 80 | 20 | -- | -- |
| II | Partial Differential Equations \& Mechanics |  | 80 | 20 | -- | -- |
| Optional Papers |  |  |  |  |  |  |
| III | A | Operating System and Database Management System | 70 | -- | 30 | For regular students |
|  | B | Cosmology (II) | 80 | 20 | -- | -- |
|  | C | Fuzzy Set Theory \& Its Applications | 80 | 20 | -- | -- |
|  | D | Mathematical Biology(II) | 80 | 20 | -- | -- |
| IV | A | Operations Research (II) | 80 | 20 | -- | -- |
|  | B | Wavelets (II) | 80 | 20 | -- | -- |
| V | A | Programming in C (with ANSI Features) (II) | 70 | -- | 30 | For regular students |
|  | B | Graph Theory (II) | 80 | 20 | -- |  |
|  | C | Algebraic Number Theory | 80 | 20 | -- |  |

