A meeting of Board of Studies to approve the revised syllabi of M.Sc./M.A. Sem. III Numerical Analysis and to approve the modified syllabi (minimum common syllabi of UGC) of B.Sc./B.A. IIIrd year, was held on 16.11.2013 at 11:30 AM in the, Ch. Charan Singh University, Meerut. The following members were present:

1. Prof. Y. Vimala as Dean, Faculty of Science, C.C.S. University, Meerut (for Prof. H.S. Singh)
2. Prof. S. P. Gupta, Rtd. Principal, BSA College, Mathura (Expert)
3. Prof. (Rtd.) V. P. Kaushik, Department of Maths, Kurukshetra University, Kurukshetra (Expert)
4. Prof. R. C. Mittal, Department of Maths, IIT Roorkee (Expert)
5. Prof. R. C. Dimri, Department of Maths, HNB University, Garval (Expert)
6. Prof. Jaimala, Head, Department of Maths, C.C.S. University, Meerut (Convenor)
7. Dr. Raj Pal Singh, Department of Maths, L.R. College, Sahibabad (Convenor)
8. Prof. M.K. Gupta, Department of Maths, C.C.S. University, Meerut
9. Dr. Hari Kishan, D.N. College, Meerut

• The committee reviewed the minimum unified syllabi for B.Sc./B.A. III year (Mathematics) in detail and proposed and approved the following changes to be effective from the session 2013-14:

1. The number of papers in B.Sc/B.A-III will be three in place of four.
2. The details of papers will be as follows
   - Numerical Methods

Syllabi of Above papers is enclosed herewith. (9.11.13)

Important: The teacher should spend 75% of lectures on theory and 25% of lectures on problems. As the classes of B.Sc./B.A. III year have already been started in the colleges, the course will not suffer with the above proposed and approved changes.

• In view of the changes approved in the papers and syllabi of B.Sc./B.A. III year, the committee reviewed the syllabi for mathematics of M.Sc./M.A. and revised the syllabi of Numerical Analysis. The papers of M.Sc/M.A.-IV Sem are reshuffled the course of Functional Analysis will be compulsory and Fuzzy Sets and its applications will be optional. The changes will be implemented from the session 2014-2015.

Remaining papers and syllabus (enclosed) of M.Sc./M.A. will remain the same as before. (15.11.13)
The committee also approved the syllabi of the paper of Mathematics for Course Work for Ph.D. There may be objective type question papers evaluation. However, the committee feels that it should be reviewed after each year.

The list of experts for Ph.D course work is enclosed herewith.

(Y.Vinija)  (S.P. Gupta)  (R.C. Mittal)  (V.P. Kaushik)  (R.C. Dimri)

(Mridul Kumar Gupta)  (Jaimala)  (Raj Pal Singh)  (Harikishen)

Sub: Approval:

To: 1. The Vice Chancellor, CCS University, Meerut
     2. Committee Cell, CCS University, Meerut.

Regd. No.

May kindly accept my regards.

Based on a draft submitted  by

Acad. Council and the Faculty

Acad. Council Meeting for approval

Submitted on October 21/10/13

Dr. (Mrs.) R. Sridevi, Sir.”
Unit 1. Axiomatic study of real numbers, Completeness property in R, Archimedean property, Countable and uncountable sets, Neighbourhood, Interior points, Limit points, Open and closed sets. Derived sets, Dense sets, Perfect sets, Bolzano-Weierstrass theorem.

Unit 2. Sequences of real numbers, Subsequences, Bounded and monotonic sequences, Convergent sequences, Cauchy's theorems on limit, Cauchy sequence, Cauchy's general principle of convergence, Sequential continuity, Boundeness and intermediate value properties of continuous functions, Uniform continuity, Meaning of sign of derivative.

Unit 3. Riemann integral, Integrability of continuous and monotonic functions, Fundamental theorem of integral calculus, Mean value theorems of integral calculus, Improper integrals and their convergence, Comparison test, μ-test, Abel's test, Dirichlet's test, Integral as a function of a parameter and its differentiability and integrability.

Unit 4. Functions of a complex variable, Concepts of limit, continuity and differentiability of complex functions, Analytic functions, Cauchy Riemann equations (Cartesian and polar form), Harmonic functions, Orthogonal system, Power series as an analytic function.

Unit 5. Elementary functions, Mapping by elementary functions, Linear and bilinear transformations, Fixed points, Cross ratio, Inverse points and critical points, Conformal transformations.

Paper III(b): LINEAR PROGRAMMING

Paper code: US-327

Unit 1. Linear programming problems, Statement and formation of general linear programming problems, Graphical method, Slack, and surplus variables, Standard and matrix forms of linear programming problem, Basic feasible solution.

Unit 2. Convex sets, Fundamental theorem of linear programming, Simplex method, Artificial variables, Big-M method, Two phase method.


Unit 4. Duality in linear programming problems, Dual simplex method, Primal-dual method Integer programming.

Unit 5. Transportation problems, Assignment problems.

Goal Programming: Concept of goal programming, formulation and methodology for solution of goal programming.

NUMERICAL METHODS AND COMPUTER FUNDAMENTALS

Paper Code: US-328

Unit 1. Discussion of different type of Errors, Shift operator, Forward difference, Backward difference and Central difference operators and their relationships, Fundamental theorem of difference calculus, Divided differences.

Unit 2. Interpolation, Newton-Gregory's forward and backward interpolation formulae, Newton's divided difference formula, Lagrange's interpolation formula, Formulae based on central differences: Gauss, Stirling's, Bessel's and Everett's interpolation formulae, Numerical differentiation.

Unit 3. Solution of transcendental and polynomial equations by iterative methods.
bisection method, Regular-falsi method and Newton-Raphson method, Successive iteration Method

Unit 4. Basic computer organization, Computer arithmetic and Number systems: Binary, octal and hexadecimal system, Storage devices, Operating system

Unit 5. Computer software, Programming languages, Computer networking: LAN, WAN and Computer network topologies

(Y.Vimla) (S.P. Gupta) (R.C. Mittal) (V.P. Kaushik) (R.C. Dimri)
(Mridul Kumar Gupta) (Jaimala) (Raj Pal Singh) (Harikishen)
NUMERICAL ANALYSIS (M. Sc./ M.A.)

Unit I

Errors in computation: Floating point representation of numbers, Significant digits, Rounding and chopping a number and error due to these absolute and relative errors, Computation of errors using differentials, Errors in evaluation of some standard functions, Truncation error.


Unit II


Unit III

Numerical differentiation: Differentiation methods based on Newton’s forward and backward formulae, Differentiation by central difference formula.


Unit IV

Algebraic Eigen values and Eigen vectors: Power method, Jacobi’s method, Given’s method, Householder’s method, Approximation: Least square polynomial approximation, polynomial approximation using orthogonal polynomials, Approximation with algebraic and trigonometric functions.

Unit V


RECOMMENDED BOOKS

1. Radhey S. Gupta, Elements of Numerical Analysis, Macmillan India Ltd. New Delhi.
3. E.V. Krishnamurthy and S.K. Sen, Computer Based Numerical Analysis, PHI.
4. B. Bradie, A Friendly Introduction to Numerical Analysis, PEARSON.

(Y. Vinja) (S.P. Gupta) (R.C. Mittal) (V.P. Kaushik) (R.C. Dimri)

(Mridul Kumar Gupta) (Jaimala) (Raj Pal Singh) (Herrikishen)
Mathematics for Course Work of Ph. D.

Unit I - Extension fields, Algebraic and transcendental extensions, Separable extensions, Normal extensions, Perfect fields, Finite fields, Primitive elements, Algebraically closed fields, Automorphisms of extensions, Galois extensions, Fundamental theorem of Galois theory.
Canonic forms, Diagonal forms, Triangular forms, Jordan forms, Inner product spaces, Orthonormal basis, Quadratic forms, Reduction and classification of quadratic forms.

Unit II - Sequences and series of functions, Pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel’s and Dirichlet’s tests for uniform convergence, uniform convergence and continuity, Weierstrass approximation theorem.

Unit III - Linear system of ordinary differential equations, Asymptotic stability, Existence and uniqueness theorems, Classification and characteristics of higher order ODE’s, Canonical form, Dirichlet’s theorem, Neumann theorem, Conservation laws and shocks systems in one dimension: Conservation laws, Weak solution, Maximum principles for parabolic equations (i) weak maximum principle, (ii) Strong maximum principle.

Unit IV - Fourier integral formula, Fourier transform, Inversion theorem for complex Fourier transform, Fourier Sine and Cosine transforms, Inversion formulae, Convolution theorem for Fourier transforms, Parseval’s identity, Finite Fourier sine and Cosine transform Inversion formulae, Applications to integral equations and boundary value problems, Z-transform, Hypergeometric functions.

Unit V - Goal programming techniques, Nonlinear programming-one and multi-variable unconstrained optimization, Kuhn-Tucker conditions for constrained optimization, Quadratic Programming, Separable programming, Convex programming.

RECOMMENDED BOOKS
10. F. B. Hildebrand, Method of Applied Mathematics, PHI, India.

(Y. Vinla) (S.P. Gupta) (R.C. Mittal) (V.P. Kaushik) (R.C. Dimri)
(Mridul Kumar Gupta) (Jaimala) (Raj Pal Singh) (Harikishen)