



TRIPURA UNIVERSITY

**(A Central University)
Suryamaninagar-799022**

Syllabus

OF

**Mathematics
(General & Major)**

Semester – IV

2014

B.A. / B. Sc. and IMD Semester-IV (General)

MATHEMATICS

Paper-IV

Mark : 20+80=100

Unit-I(20+20=40)

(Linear Programming Problem)

1. What is LPP? Mathematical form of LPP formulation. LPP in matrix notation. Graphical solution of LPP. Basic solution, Basic feasible solution, degenerate and non-degenerate BFS. Euclidean space, hyperplane, convex set, extreme points, convex functions and concave functions, the hyperplane in convex set. Intersection of two convex sets is convex set, the collection of all feasible solution of a LPP constitutes a convex set. A BFS to a LPP corresponds to an extreme point of convex set of feasible solutions.

2. Slack, surplus and artificial variables, standard form of LPP, Fundamental theorem of LPP and their applications, theory and application of the simplex method of solution of LPP. Charne's M-technique.

3. Duality. Transportation problem. TP in LPP form, Balanced TP. Optimality test of BFS. Assignment problem. Solution of AP [(Maximization, unbalanced, negative cost and impossible assignment. Traveling salesman problem.

Problem should be set on simplex and Charne's method, two phase method in such a way that it may contain at most three or four tableau with approximate marks.)

References:

1. Linear Programming Problem- Chakroborty and Ghosh-U.N.Dhur and Sons
2. Operations Research-Kantiswarup et. al, Sultan Chand and Sons.
3. Linear Programming and Theory of Games, P.M.Karak, Central Book Agency.

Unit-II(20+20=40)

(Probability Theory & Vector Calculus)

1. Frequency and Axiomatic definition of probability. Random variables. Probability Distribution function. Discrete and continuous random variable, probability mass function and probability density function, mathematical expectation, mean and variance (simple problems only). Binomial, Poisson, uniform, Normal, Beta and Gamma Distributions. Moments of a probability distribution, skewness and kurtosis of a probability distribution. moment generating function. Transformation of one dimensional random variable (simple applications).

2. Vector function, limit and continuity, derivative of vector, derivative of sums and product of vector functions. A necessary and sufficient condition that a proper vector \hat{a} (i) has a constant length that $\hat{a} \cdot d\hat{a}/dt = 0$. (ii) always remains parallel is that $\hat{a} \times d\hat{a}/dt = \vec{0}$.

3. Vector integration. scalar and vector fields, directional derivatives, gradient of a scalar point function, ∇ operator, divergence, curl and Laplacian.

Line, surface and volume integral. Statement of Gauss's, Stoke's theorem and problem based on these.

References:

1. Ground Work of Mathematical Probability and Statistics-Amritabha Gupta. Academic Pub.
2. Statistical Methods, VIII-I and II-N.G.Das
3. Vector Analysis-Maitty and Ghosh. New Central Book Agency.
4. Vector Analysis- Schaum's series. Tata McGrawHill

B.A. / B. Sc. and IMD(M) Semester-IV (Honours)

MATHEMATICS

Paper-IV

Mark : 20+80=100

Unit-II(20)

(Differential Equations-I)

1. Significance of ordinary differential equation. Geometrical and physical consideration. Formation of differential equation by elimination of arbitrary constant. Meaning of the solution of ordinary differential equation. Concept of linear and non-linear differential equations. Equations of first order and first degree : Statement of existence theorem. Separable, Homogeneous and Exact equation. Condition of exactness, Integrating factor. Rules of finding integrating factor, (statement of relevant results only), Equations reducible to first order linear equations.
2. Equations of first order but not of first degree, Clairaut's equation. Singular solution. Applications : Geometric applications, Orthogonal trajectories. Higher order linear equations with constant co-efficients : Complementary function, Particular Integral, Symbolic operator D.
3. Method of undetermined co-efficients, Method of variation of parameters. Euler's homogeneous equation and Reduction to an equation of constant coefficients.

Unit-II(20)

(Differential Equations-II)

1. Exact differential equations of higher order, method of solution, Non-linear exact equations, linear equations of some special forms,
2. Second order linear equations with variable co-efficients, Reduction of order when one solution the homogeneous part is known. Complete solution. Method of variation of parameters.
3. Reduction to Normal form. Change of independent variable. Operational Factors. Simple eigenvalue problems. Simultaneous linear differential equations.

References:

1. Differential Calculus-Das and Mukherjee, U.N. Dhur & Sons.
2. Integral Calculus-Das and Mukherjee, U.N. Dhur & Sons.
1. Advanced Differential Equation-M.D.Raisinghania-S.Chand.
2. Simplified course in differential equation-M.D.Raisinghania-S.Chand.

Unit-III(20)

(Linear Programming Problem-I)

- 1 What, is LPP ? Mathematical form of LPP formulation. LPP in matrix notation. Graphical solution of LPP. Basic solution, Basic feasible solution, degenerate and non-degenerate BFS.
- 2 Euclidean space, hyperplane, convex set, extreme points, convex functions and concave functions, the hyperplane in convex set. Intersection of two convex sets is convex set, the collection of all feasible solution of a LPP constitutes a convex set. A BFS to a LPP corresponds to an extreme point of convex set of feasible solutions.
- 3 Slack, surplus and artificial variables, standard form of LPP, Fundamental theorem pf LPP and their applications, theory and application of the simplex method of solution of LPP. Charne's M-technique.

Unit-IV(20)

(Linear Programming Problem-II)

- 1 Degeneracy. The two phase method.
- 2 Duality theory. The dual of the dual is primal. relation between the objective function value of dual and primal problems. Relation between their optimal values. Statement of fundamental theorem of duality. Dual simplex method.
- 3 Transportation problem. TP in LPP form, Balanced TP. Optimality test of BFS. Assignment problem. Solution of AP [(Maximization, unbalanced, negative cost and impossible assignment. Traveling salesman problem.
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