GONDWANA UNIVERSITY

GADCHIROLI

SEMESTER SYSTEM PATTERN SYLLABUS

for

B.Sc.

Mathematics

SEMESTER – V

(With effect from : 2014-15)

SYLLABUS

B. Sc. III (Semester – V)
Paper – I (Compulsory)
MAT 301 : Linear Algebra

Total Marks : 75 (60+15)

UNIT – I

Analytic function, Cauchy Riemann equation, Polar form of C – R equations, Harmonic function, Mobius transformation, Cross ratio.

UNIT – II

Vector space, Subspace, Linear span, Quotient space, Linear dependence and independence and their basic properties, Basis and dimension.

UNIT – III

Linear transformations : The algebra of linear transformation, Rank-Nullity theorem, Matrix and linear transformation, Rank and Nullity of a matrix, Isomorphism.

UNIT – IV

Inner product space: Inner product, Cauchy Schwartz inequality, Orthogonal vectors, Orthogonal complement, Orthonormal set. Bessel's inequality for finite dimensional space, Gram – Schmidth orthogonalisation process.

Reference Books :-

1. Prof. T. M. Karade, J. N. Salunke, K. S. Adhav and M. S. Bendre, Abstract Algebra, Sonu Nilu, Bandu Soni Layout, Gayatri road, Parsodi, Nagpur.

2. N. Herstein. Topics in Algebra, Wiley eastern, Ltd. New Delhi, 1975.

3. N. Jacobson, Basic Algebra, Vols. I & II. W. H. Freeman, 1980 (Also published by Hindustan company).

4. Shanti Narayan, A Text Book of Modern Abstract Algebra, S. Chand & Co., New Delhi

5. K. B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. New Delhi, 2000.

6. P. B. Battacharya, S. K. Jain and S. R. Nagpal, Basic Abstract Algebra (2nd Edition) Cambridge University Press. Indian Edition. 1997.

7. K. Hoffman and R. Kunze. Linear Algebra, 2nd Editions, Prentice-Hill. Englewood Cliffs (New Jersey), 1971.

8. S. K. Jain, A. Gunawardena and P. B. Battacharya, Basic Linear Algebra with MATLAB, Key College Publishing (Springer-Verlag) 2001.

9. S. Kumaresan, Linear Algebra, A Geometrical Approach. Prentice Hall of India. 2000.

10. Vivek Sahani and Vikas Bist. Albebra, Narosa Publishing House. New Delhi, 1997.

11. I. S. Luther and I. B. S. Passi, Algebra, Vol. I-Groups. Vol. II-Rings. Narosa Publishing House (Vol. 1-1996, Vol. II-1999), New Delhi.

12. D. S. Malik, J. N. Mordeson and M. K. Sen. Fundamentals of Abstract Algebra. McGraw-Hell International Edition, 1997.

SYLLABUS

B. Sc. III (Semester – V)

Paper – II (Optional)

MAT 302 : Special Relativity - I

Total Marks : 75 (60+15)

UNIT – I

Review of Newtonian mechanics, Inertial Systems, Galilean transformations, Newtonian relativity, Conservation laws in Newtonian mechanics, Maxwell's electromagnetic theory, Michelson-Morley experiment, Lorentz Fitzgerald contraction hypothesis, Relative character of space and time.

UNIT – II

Einstein's special theory of relativity, postulates of special relativity theory, Lorentz transformation, Geometrical interpretation of Lorentz transformation, Group properties of Lorentz transformation, Length contraction, Time dilation.

UNIT – III

Relativistic Kinematics – Composition of parallel velocities, Transformation equations for components of velocity, Relativistic addition law for velocities, transformation of Lorentz contraction factor $(1-v^2/c^2)^{1/2}$, The transformation equation for components of acceleration of a particle.

UNIT – IV

Geometrical representation of space time, Four dimensional Minkowskian space time of special relativity, Time like, Light-like and space-like intervals, Lorentz transformation in index form, proper time, world line of a particle, Four vectors and Four tensor in Minkowskian space-time.

Reference Books :-

1. Lectures on Special Relativity
   Prof. T. M. Karade, K. S. Adhav and Maya S. Bendre, Sonu Nilu.
2. C. Moller, The theory of Relativity, Oxford Clarendon Press, 1932.
3. P. G. Bergmann, Introduction to the theory of relativity, Prentice Hall of India, Pvt. Ltd. 1969.
4. I. I. Anderson, Principle of relativity Physics, Academic Press, 1967.
5. Murray R. Spiegel, Theory and Problems on vector Analysis SIJ Metrics and
       Introduction to Tensor Theory, Shaum's outline Series, Mc. Gra. Hill Book Company

SYLLABUS

B. Sc. III (Semester – V)

Paper – III (Optional)

MAT 303 : Linear Programming and Transportation Problem

Total Marks : 75 (60+15)

UNIT – I

Linear Programming Problem : Convex Set, Extreme points of a convex set, Convex combination, Fundamental theorem of linear programming, Definition, Formulation of linear programming problems (LPP), Graphical solution of linear programming problems, General formulation of LP problems, Standard form and matrix form of LP problems.

UNIT – II

Simplex Method : Introduction, Definitions and notations, Computational procedure of simplex algorithm, Simple way for simplex computations, Artificial variables, Two-phase method, Alternative method of two-phase simplex method.

UNIT – III
Transportation Problems
Mathematical formulation of Transportation problem, Tabular representation, Definitions, Special structure of the solution, North-west corner rule, Vogel's approximation method, Method of finding optimal solution, algorithm for solving transportation problem
UNIT – IV

Assignment Problems : Introduction, Mathematical formulation of Assignment problem, Reduction theorem, Hungarian Method for solving Assignment problem, Unbalanced Assignment problem

Prescribed text book Scope as in "Operations Research" by S.D. Sharma, Kedar Nath Ram Nath & Co, Meerut.

Reference text Book: "Operation Research" by Kanthi Swarup, R.K. Gupta and Manmohan, S. Chand publications, New Delhi.