Gondwana University, Gadchiroli

Faculty of Science & Technology

Proposed Syllabus For

B.Sc. Mathematics

Semester-III & Semester-IV

(Choice Based Credit System)

With effect from

Academic Year: 2018-19

(Considered and Approved in B.O.S. in Mathematics)

Gondwana University, Gadchiroli

B.Sc. Mathematics

Semester-III & IV

(Choice Based Credit System)

Semester-III

Paper –V: USMT-05 Real Analysis

Paper- VI: USMT-06 Set Theory and Laplace Transform

Semester-IV

Paper – VII: USMT-07 Algebra

Paper- VIII: USMT-08 Elementary Number Theory

B.Sc. Mathematics
Semester-III
(Choice Based Credit System)

Paper –V: USMT-05
Real Analysis

Max. Mark- 60 + 15

Unit-I

Real sequence, bounded sequence, Cauchy convergence criterion for sequences, Cauchy's theorem on limits, monotone sequences and their convergence, monotone convergence theorem.

Unit – II

Infinite series, Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test, test for convergence.

Unit – III

Metric, Neighbourhood, closed sets, open sets, bounded sets, DeMorgan's law, definition of metric space, subspace of metric space, open sphere, closed sphere, Cauchy sequence, complete metric space.

Unit-IV

Riemann integral, Darboux's upper and lower sums, lower and upper integrals, Riemann integral, criterion for Riemann integrability, properties of integrable functions, integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorem of integral calculus.

Reference Books

1. I. M. Apostol – Calculus (Vol. I), John Wiley and Sons (Asia)P. Ltd., 2002
2. R. G. Bartle and D. R. Sherbert - Introduction to Real Analysis, John Wiley and Sons (Asia)P. Ltd., 2000.
3. E. Fischer - Intermediate Real Analysis, Springer Verlag, 1983
4. T. M. Karade , J.N. Salunke, K. S. Adhav and M. S. Bendre - Analysis , Sonu –Nilu Publ. Nagpur, 2004
5. T. M. Karade - Mathematical Analysis , Sonu –Nilu Publ. Nagpur, 2014
6. Walter Rudin – Principle of Mathematical Analysis , 3rd Edition Mac Graw Hill, 1976

B.Sc. Mathematics
Semester-III
(Choice Based Credit System)

Paper- VI: USMT-06
Set Theory and Laplace Transform

Max. Mark- 60 + 15

Unit-I

Sets, subsets, basic set operations, Venn diagrams, finite and infinite sets, classes of sets, power of a set, countable and uncountable sets, basic sets of numbers, set of real numbers R, real line, supremum and infimum, completeness property of R, Archimedean property of R, Cartesian products of two sets, relations, types of relations, equivalence relation.

Unit-II

Basic concepts of Fuzzy sets, examples of fuzzy sets, operations on fuzzy sets: intersection, union and complements of fuzzy sets, alpha cuts and convex fuzzy sets, normal fuzzy sets.

Unit-III

Laplace transform, existence theorem for Laplace transform, linearity of Laplace transform, shifting theorem, Laplace transform of derivatives and integrals.

Unit-IV

Inverse Laplace transform, convolution theorem, solution of differential equations and partial differential equations

Reference Books

1. R. P. Grimaldi - Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998
2. P. R. Halmos -Naïve Set Theory, Springer, 1974
3. E. Kamke - Theory of Sets, Dover Publication, 1950
4. Erwin Kreyszig – Advanced Engineering Mathematics, John Willey and Sons Inc, 1999
5. T.M.Karade – Partial Differential Equations and Laplace Transform, Sonu-Nilu Publication, Nagpur, 2013
6. Seymour Lipschutz- Schaum's out lines- Set Theory and Related Topics , Tata MacGraw Hill Education Pvt. Ltd. 5th Edition -2005
7. G. J. Klir and Bo Yuan – Fuzzy Sets and Fyzzy Logic , PHI Publication
8. T. M. Karade, J. N. Salunke, M. S. Bendre – Elements of Calculus, Group and Fuzzy Sets, - Sonu Nilu Publication -2010, Nagpur.
9. Ross Timothy J. –Fuzzy Logic with Engineering Applications –Wiley India 2nd Edition 2007

B.Sc. Mathematics
Semester-IV
(Choice Based Credit System)

Paper –VII: USMT-07
Algebra

Max. Mark- 60 + 15

Unit-I

Group: definition of a group with examples, properties of a group, subgroups, cyclic groups, order of a generator of a cyclic group, permutation groups, even and odd permutations.

Unit-II

Cosets and Normal Subgroups: cosets, Langrage's theorem, normal subgroups: their definition, examples, and characterizations, algebra of normal subgroups, quotient groups.

Unit – III

Homomorphism and Isomorphism: homomorphism, homomorphic image, kernel of homomorphism, isomorphism of a group, fundamental theorem on homomorphism of a group, Natural homomorphism, second isomorphism theorem, third isomorphism theorem .

Unit-IV

Ring, Integral domain and Field: definition, examples and properties of a ring (commutative ring, ring with unity, zero divisor, without zero divisor), subring, characterization of ring, integral domain, field.

Reference Books

1. I. N. Herstein - Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975
2. John B. Fraleigh - A First Course in Abstract Algebra,7th Ed. Pearson , 2002
3. M. Artin-Abstract Algebra, 2nd Ed. Pearson , 2011
4. Joseph A. Gallian-Contemporary Abstract Algebra , Narosa, 1999
5. N. Jocobson- Basic Algebra ,Vol I and II W.H. Freeman ,1980, (Hindustan Publ. Co.)
6. K. B. Datta – Matrix and Linear Algebra , Prentice Hall of India Pvt. Ltd. New Delhi , 2000
7. P. B. Bhattacharya , S.K.Jain, and S.R. Nagpal – Basic Abstract Algebra , II nd Edition , Cambridge Uni. Press Indian Edition , 1997
8. Shanti Narayan – A Text Book of Modern Abstract Algebra , S. Chand and Co. New Delhi
9. Vivek Sahai and Vikas Bisht – Algebra , Narosa Publishing House , 1997
10. T. M. Karade , J. N. Salunke , K. S. Adhav ,S. D. Katore, Rekha Rani – Modern Algebra (Groups- Rings) Sonu- Nilu Publ. (Ist Publication)Nagpur, 2014

B.Sc. Mathematics
Semester-IV
(Choice Based Credit System)

Paper- VIII: USMT-08
Elementary Number Theory

Max. Mark- 60 + 15

Unit-I

Divisibility, division algorithm, the greatest common divisor, greatest common divisor of more than two integers, Euclidean algorithm, least common multiple.

Unit- II

Prime numbers, the Fundamental theorem of arithmetic or unique factorization theorem, Fermat numbers, linear Diphantine equation.

Unit-III

Congruence, properties of congruence, special divisibility test, linear congruence, Chinese reminder theorem, Goldbach conjuncture

Unit-IV

Arithmetic function, Euler's theorem, Mobius μ function, the τ and σ functions, Pythagorean triplets.

Reference Books

1. David M. Burton - Elementary Number Theory, 6th Ed. Tata McGraw-Hill Edition, Indian Reprint, 2007
2. Richard E. Klima, Neil Sigmon , Ernest Stitzinger - Applications of Abstract Algebra with Maple, CRC Press, Boca Raton, 2000
3. Neville Robinns - Beginning Number Theory, 2nd Ed. Narosa Publishing House Pvt. Ltd., Delhi,2007
4. I. Niven , S.H. Zuckerman and I.H. Montgomery - An Introduction to the Theory of Numbers , John Wiley, 1991
5. T. M. Karade, J. N. Salunke, K. D. Thengane , M. S. Bendre – Lectures on Elementary Number Theory,Sonu- Nilu Publ. , Nagpur , 2005
6. C.Y. Hsiung - Elementary Theory of Numbers, Allied Publishers Ltd. 1992
7. G.A.Jones and I. M. Jones - Elementary Number Theory, Springer, 1998
8. W. Slerpinski - Elementary Theory of Number, North- Holland, 1988, Ireland
9. K.H.Rosen - Elementary Number Theory and its Applications, Addison – Wesley, 1986