

## Syllabus Prescribed for B.Sc. Second Year Examination

### Semester III

#### 3S Mathematics Paper- V (Advanced Calculus)

**Unit I:** Sequence: Definition of sequence, uniqueness of limit of sequence, algebra of limit of a sequence, positivity theorem, sandwich theorem, monotonic and bounded sequence, Cauchy sequence.

**Unit II:** Series: Series of nonnegative terms, convergence of geometric series and the series  $\sum \frac{1}{n^p}$  Comparison tests, Cauchy's integral test, ratio test, root test, absolute convergent, conditional convergent, Leibnitz rule, Abel's test, Dirichlet test.

**Unit III:** Limit and continuity of functions of two variables, algebra of limit and continuity, intermediate value property, fixed point property, Taylor's theorem for function of two variables.

**Unit IV:** Maxima and minima of two variables, Lagrange's multipliers method, Jacobians.

**Unit V:** Double integral (definition and evaluation technique), change of order of double integral, triple integral, Gauss and Stoke's theorem.

#### Reference Books :

1. Gorakh Prasad : Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
2. Gorakh Prasad : Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
3. Muray R. Spiegel : Theory and Problems of Advanced Calculus, Schaum Outline Series.
4. S. C. Malik and Arora : Mathematical Analysis, Wiley Eastern Ltd., New Delhi.
5. O. E. Stanaitis : An Introduction to Sequences, Series and improper Integrals, Holden- Dey , Inc. San Francisco, California.
6. T. M. Karade, J. N. Salunke, A. G. Deshmukh, M. S. Bendre: Lectures on Advanced Calculus, Sonu-Nilu Publication, Nagpur.
7. Earl D. Rainville : Infinite series, The Macmillan Co., New York.
8. N. Piskunov : Differential and Integral Calculus, Peace publishers, Noscov.
9. Shanti Narayan : A Course of Mathematical Analysis, S. Chand & Co., New Delhi.
10. D. Somasundaram and B. Choudhary: A First course in Mathematical Analysis, Narosa Publ. House.

**Semester III**  
**3S Mathematics Paper- VI (Elementary Number Theory)**

**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 Diophantine equation.

**Unit III:** Congruence, properties of congruence, special divisibility test, linear congruences, Chinese remainder theorem.

**Unit IV:** Arithmetic functions, Euler's theorem, the  $\tau$  and  $\sigma$  functions, Mobius  $\mu$  function.

**Unit V:** Primitive roots, primitive roots for prime, polynomial congruences, The congruence,  $x^2 \equiv a \pmod{p}$  general quadratic congruence, quadratic residues.

**Reference Books:**

1. D. M. Burton: Elementary Number Theory, Universal Book Stall, New Delhi, Second Edition 2003.
2. C.Y. Hsiung: Elementary Theory of Numbers, Allied Publishers Ltd. 1992.
3. I. Niven, H. S. Zuckerman and H. L. Montgomery: An introduction to the Theory of Numbers, Wiley Student Edition, Fifth edition 2004.
4. K. H. Rosen: Elementary Number Theory and its Applications, Addison- Wesley, 1986.
5. T. M. Karade, J. N. Salunke, K. D. Thengane, M. S. Bendre: Lectures on Elementary Number Theory, Sonu-Nilu publication 2005.
6. K. Ireland and M. Rosen: A Classical Introduction to Modern Number Theory, GTM Volume 84, Springer-Verlag 1972
7. G. A. Jones and I. M. Jones: Elementary Number Theory, Springer, 1998
8. W. Sierpinski: Elementary Theory of Number, North-Holland, 1988, Ireland.
9. K. Rosen and M. Rosen: A Classical Introduction to Modern Number Theory, GTM Volume 94, Springer-Verlag, 1972.