



Date: 06-11-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Answer **ALL** questions:

- I. a) Define combinatorial distribution with an example.
Or
b) Find the partitions of 4-set into 3 classes. (5)
- c) i) In how many permutations of the word AUROBIND do the vowels appear in alphabetical order?
ii) Prove that the number of distributions of n distinct objects into m distinct boxes with the objects in each box arranged in a definite order is $[m]^n$. (7+8)
Or
- d) i) There are 16 books on a bookshelf. In how many ways can 6 of these books be selected if a selection must not include two neighboring books?
ii) Derive the Strling numbers of the first kind and tabulate the value for S_7^7 . (6+9)
- II. a) Prove the algebra of formal power series.
Or
b) Define exponential generating function with an example (5)
- c) Prove by recurrence relation, $1^3 + 2^3 + 3^3 + \dots + n^3 = \left(\frac{n(n+1)}{2}\right)^2$.
Or
d) If n lines are in general position, what is the number of regions into which they divide the line? (15)
- III. a) List all the expressions of complete homogeneous symmetric function h_4 .
Or
b) Define symmetric function with an example. (5)
- c) Briefly explain the four types of symmetric functions.
Or
d) Given $\lambda \rightarrow N$, prove that k_λ is a linear combination of the s_μ 's. (15)
- IV. a) Find the number of positive integers, not greater than 100, which are not divisible by 2, 3, or 5.
Or
b) Prove the recurrence relation, $R(t, C) = t R(t, C_{dd}) + R(t, C'_d)$ for the rook Polynomial. (5)
- c) Briefly explain the problem of Fibonacci with an example.
Or
d) State and prove the generalized theorem of Inclusion and Exclusion principle. (15)

V. a) Find the cycle structures of all permutations of 20 beads on a circular necklace generated by a single permutation

Or

b) How many distinct circular word patterns of length 8 are possible on an alphabet of two letters? (5)

c) State and prove Burnside's lemma.

Or

d) State and prove Polya's enumeration theorem. (15)

