K22U 1320

Reg. No. : ....

Name : ....

II Semester B.Sc. Hon's (Mathematics) Degree (C.B.C.S.S. – Supplementary/ Improvement) Examination, April 2022
(2016-2020 Admissions)
BHM 205 : GRAPH THEORY AND DISTRIBUTION FUNCTIONS

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **any 4** questions out of 5 questions. **Each** question carries **1** mark.

1. Draw the complete bipartite graph $K_{3,3}$.
2. Degree of each vertex of a complete graph on n vertices.
3. If X follows N (μ, σ^2), then $M_X(t)$ = ________
4. In binomial distribution, the variance σ^2 and mean μ are related by ________
5. In which distribution mean is equal to the variance ________ **(4×1=4)**

SECTION – B

Answer **any 6** questions out of 9 questions. **Each** question carries **2** marks.

6. Show that every forest of order n with k components has size n – k.
7. What are self-Complementary graphs ? Give one example.
8. Draw all trees on 6 vertices.
9. Define spanning tree. Draw all the spanning trees of K_3.
10. Prove that every graph has an even number of odd vertices.
11. Define Gamma distribution and obtain the mean.
12. Find the moment generating function of a Poisson distribution with the parameter λ.

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13. Define Negative exponential distribution.
14. If X follows Beta distribution of type I with parameters m and n, what is its mean ? **(6×2=12)**

SECTION – C

Answer **any 8** questions out of 12 questions. **Each** question carries **4** marks.

15. A certain graph G has order 14 and size 27. The degree of each vertex of G is 3, 4 or 5. There are six vertices of degree 4. How many vertices of G have degree 3 and how many have degree 5 ?
16. If G and H are isomorphic graphs, prove that degrees of the vertices of G are same as the degrees of vertices of H.
17. Show that a graph G is a tree if and only if every two vertices of G are connected by a unique path.
18. Is there a simple graph corresponding to the following degree sequences :
    i) (1, 1, 2, 3)
    ii) (2, 2, 4, 6).
19. Draw all non-isomorphic graphs on four vertices.
20. For every natural number n, prove that the edge connectivity $\lambda(K_n) = n - 1$.
21. Give the properties of Normal distribution.
22. If X and Y are independent Poisson variates, show that the conditional distribution of X given X + Y is binomial.
23. Define exponential distribution and obtain its moment generating function.
24. Find the moment generating function of a normal distribution and prove its additive property.

25. Let the random variable assumes the value x with the probability law $p(X = x) = pq^x$; x = 0, 1, 2, 3... and q = 1 – p. Find the moment generating function of X and hence find its mean and variance.
26. i) Find the mean and variance of Uniform distribution over the interval (a, b).
    ii) What are the characteristics of Poisson distribution ? **(8×4=32)**

SECTION – D

Answer **any 2** questions out of 4 questions. **Each** question carries **6** marks.

27. State and prove the recurrence relation for central moments for a binomial distribution.
28. Fit a Poisson distribution to the following data :

Number of mistakes per page :	0	1	2	3	4	total
Number of pages :	109	65	22	3	1	200

29. For every graph G, prove that $K(G) \le \lambda(G) \le \delta(G)$.
30. Show that a non-trivial graph G is bipartite if and only if G contains no odd cycles. **(2×6=12)**