K20U 0236

Reg. No. : .....

Name : .....

II Semester B.Sc. Hon's (Mathematics) Degree (Reg./Supple./Improv.) Examination, April 2020
(2016 Admission Onwards)
BHM 205 : GRAPH THEORY AND DISTRIBUTION FUNCTIONS

Time : 3 Hours Max. Marks : 60

Answer **any 4** questions out of **5** questions. (4x1=4)

1. Define a u - v geodesic in a graph.
2. Define an end block of G.
3. Find the moment generating function of the Poisson distribution.
4. Define standard normal distribution.
5. Find the characteristic function of a binomial distribution.

Answer **any 6** questions out of **9** questions. (6x2=12)

6. Define Cartesian product of two graphs and draw a grid.
7. State and prove first theorem of graph theory.
8. Prove that every graph is the center of some graph.
9. State Whitney's theorem.
10. Prove that the size of a forest of order n having k components is n – k.
11. A die is thrown 4 times. Getting a number greater than 2 is a success. Find the probability of getting
    a) exactly one success
    b) less than 3 success.

P.T.O.

12. A typist types 3 letters erroneously for every 100 letters. What is the probability that the tenth letter typed is the first erroneous letter ?

13. Write brief note on the properties of normal curve.

14. If X is a normal variable with mean 25 and standard deviation 5. Find the probability that $15 \leq X \leq 30$.

Answer any 8 questions out of 12 questions. (8×4=32)

15. For every nontrivial connected graph G, $rad(G) \leq diam(G) \leq 2rad(G)$.

16. Prove that if G is an r regular bipartite graph, $r \geq 1$, with partite sets U and V, then $|U| = |V|$.

17. Let G be a connected bipartite graph. Prove that G is a complete bipartite graph if and only if G does not contain P_4 as an induced subgraph.

18. Prove that $k(G) = \lambda(G)$ for every cubic graph G.

19. Prove that a graph G is a tree if and only if every two vertices of G are connected by a unique path.

20. Prove that every nontrivial connected graph contains at least two vertices that are not cut vertices.

21. The probability of a man hitting a target is $\frac{1}{2}$. How many times must he fire so that the probability of hitting the target at least once is more than 90% ?

22. Using the recurrence formula of the binomial distribution, compute p(x successes) for x = 1, 2, 3, 4, 5 given n = 5 and $p = \frac{1}{6}$.

23. The probability that a bomb dropped from an envelope will strike a certain target is $\frac{1}{5}$. If 6 bombs are dropped, find the probability that
    a) exactly 2 will strike the target
    b) at least 2 will strike the target.

24. Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches. How many soldiers in a regiment 1000 would be expect to be over 6 feet tall ?

25. The mean of a normal distribution is 60 and 6% of the values are greater than 70. Find the standard deviation of the distribution.

26. Define Beta distribution of first kind and second kind. Find the r^{th} moment about origin and moment generating function of Beta distribution of first kind.

Answer any 2 questions out of 4 questions. (2×6=12)

27. State and prove Menger's theorem.

28. a) Define line graph of a graph G.
    b) Show that the graph $K_{1,3}$ is not a line graph.
    c) Show that there exist two non-isomorphic connected graphs G_1 and G_2 such that $L(G_1) = L(G_2)$.

29. a) Suppose that G and its complement are connected graphs of order $n \geq 5$. Prove that if the diameter of G is at least 3 then the diameter of $\overline{G}$ is at most 3.
    b) Prove that if G is a disconnected graph then $\overline{G}$ is connected and diam $(\overline{G}) \leq 2$.

30. Fit a normal distribution to the following data by the area method.

Class :	60 – 65	65 – 70	70 – 75	75 – 80	80 – 85	85 – 90	90 – 95	95 – 100
f :	3	21	150	335	326	135	26	4