



Reg. No.:

Name :

**Second Semester B.Sc. Hon's (Mathematics) Degree (CBCSS –
Supplementary/One Time Mercy Chance) Examination, April 2024
(2016 – 2020 Admissions)
BHM 205 : GRAPH THEORY AND DISTRIBUTION FUNCTIONS**

Time : 3 Hours

Max. Marks : 60

Answer any 4 questions out of 5 questions. Each question carries 1 mark. (4×1=4)

- Define connected graphs.
- Define cycle in a graph. Give an example.
- Write the discrete geometric distribution with parameters p and q .
- Write any three properties of normal curve.
- A lot of 10 items contain 3 defectives from which a sample of 4 items is drawn without replacement. Let X be the random variable being the number of defective item in the sample. Find $P(X < 1)$.

Answer any 6 questions out of 9 questions. Each question carries 2 marks. (6×2=12)

- Show that the number of vertices of odd degree in a graph is always even.
- Define eccentricity and diameter in a graph.
- Draw Peterson graph.
- Show that every non-trivial tree contains at least two leaves.
- Differentiate trees and cycles. Draw a tree and cycle in a graph.

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- The mean and variance of a binomial distribution are 4 and 2 respectively. Find the probability less than two successes.
- A random variable X follows Poisson distribution with mean 1. Calculate $P(X = 0)$ and $P(X = 1)$.
- Let X follows normal distribution with mean 42 and standard deviation 4. Find $P(X < 40)$.
- Define beta distribution. Write its mean.

Answer any 8 questions out of 12 questions. Each question carries 4 marks. (8×4=32)

- Show that, if every vertex of G has eccentricity 1 or no vertex of G has eccentricity 1 then the graph G is periphery of some nontrivial graph.
- Show that a non trivial graph G is bipartite if it contains no odd cycles.
- Show that the distance between vertices of a connected graph is a metric.
- Show that a tree with n vertices has $n - 1$ edges.
- In a complete graph K_n , show that the edge connectivity is $n - 1$.
- Show that any connected graph with n vertices and $n - 1$ edges is a tree.
- A random variable X has the following distribution function.

Value of X, x	0	1	2	3	4	5	6	7
$P(X = x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

Find the value of k and $P(0 < X < 5)$.

- The probability of a man hitting a target is $\frac{1}{4}$. If he fires 7 times what is the probability of hitting the target at least twice ?



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- Define Poisson distribution. Derive its mean.
- Let X follows exponential distribution. Show that $P(X > s + t | X > s) = P(X > t)$, for any $s, t > 0$.
- Obtain the moment generating function of normal distribution.
- Let X has an exponential distribution with mean 2. Find $P(X < 1 | X < 2)$.

Answer any 2 questions out of 4 questions. Each question carries 6 marks. (2×6=12)

- If a graph G contains a $u - v$ walk, then show that G contains a $u - v$ path.
- State and prove Menger's theorem.
- Fit a Poisson distribution from the following data.

Number of mistakes per page	0	1	2	3	4	Total
Number of Pages	109	65	22	3	1	200

- If X has a negative binomial distribution with parameter r and p , obtain the moment generating function, hence derive the mean and variance.