QP CODE: 23800335

23800335

Reg No : .....

Name : .....

INTEGRATED PG DEGREE EXAMINATION, DECEMBER 2023

Third Semester

INTEGRATED MSC BASIC SCIENCE-STATISTICS

CORE - IST3CR01 - PROBABILITY DISTRIBUTIONS.

2020 ADMISSION ONWARDS

196A177F

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Define Harmonic Mean of a random variable.
2. If V(X) = 2, then obtain V(3X-4).
3. How you fit a Binomial distribution?
4. The chances of a student to win a test is 0.2 and assumed remains same for all attempt. If he decides to compete until success, what is his chance to win the test by fifth attempt.
5. Define Hyper geometric distribution.
6. Define two parameter gamma distribution.
7. Define Laplace distribution.
8. Write down two advantages of Chebychev's inequality.
9. State the Bernoulli law of large numbers.
10. Write down the conditions for Linberg-Levy form of Cental Limit Theorem.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. State and prove Multiplication theorem on expectation.
12. State and prove additive property of cumulants.

13. Show that the conditional distribution of X given X+Y=z where X and Y are independent Poisson random variables is binomial.

14. A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5. Calculate the probability of days on which (i) neither car is used and (ii) some demand is refused

15. Obtain the mean and variance of a continuous uniform distribution.

16. The time taken by a mechanic to repair motor bike is distributed exponentially with an average of 2 hours. Find the probabilities of repair time (i) less than 1 hour (ii) more than 4 hours given that already exceeds 2 hours

17. Explain fitting of normal distribution.

18. Define Standard normal distribution. Obtain its moment generating function.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Two random variables X and Y have joint p.d.f f(x,y) = 2-x-y ;0≤x≤1, 0≤y≤1 and 0 elsewhere.
Find, a) $f_x(x)$
b) $f_y(y)$
c) E(X/Y=y)
d) Cov(X,Y)

20. Define the binomial distribution. Write down any 3 properties of it. Obtain its mean, variance and m.g.f.

21. a) Obtain the mean and variance of a beta distribution of second kind with parameter p and q.
b)If X follows a beta distribution of first kind with parameters p and q, show that $Y = \frac{X}{1-X}$ follow beta distribution of the second kind.

22. State and prove the strong law of large numbers.

(2×5=10 weightage)