



Date: 22-04-2016

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART-A

Answer **ALL** questions

(10 x 2 = 20 marks)

1. Define Stochastic Independence.
2. Suppose that two dimensional continuous random variable (X,Y) has joint pdf given by :

$$f(x,y) = f(x) = \begin{cases} 6x^2y, & 0 < x < 1, \quad 0 < y < 1 \\ 0, & \text{elsewhere} \end{cases}$$

(i) verify that

$$\int_0^1 \int_0^1 f(x,y) dx dy = 1.$$

3. Write down the density function of Negative Binomial distribution.
4. Obtain the moment generating function of Poisson distribution.
5. If X is normally distributed and the mean of X is 12 and SD is 4. Find out the P(X≥20).
6. Obtain the MGF of Gamma distribution.
7. Write down any 2 applications of F – distribution.
8. Define students ‘t’ distribution
9. State Central Limit theorem.
10. Define Order Statistics

PART – B

ANSWER ANY **FIVE** QUESTIONS

(5 x 8 = 40)

11. The joint probability distribution of two random variables X and Y is given by :
P(X=0, Y=1) = 1/3 , P(X=1, Y= -1) = 1/3, and P(X=1, Y=1) = 1/3. find (i) Marginal distribution of X and Y and (ii) the conditional probability distribution of X given Y=1.
12. After correcting 50 pages of the proof of a book, the proof reader finds that there are, on the average, 2 errors per 5 pages. How many pages would one expect to find with 0,1,2,3 and 4 errors, in 1,000 pages of the first print of the book ? (Given that $e^{-0.4} = 0.6703$)
13. Obtain the Moments of Geometric distribution
14. What are the chief characteristics of the Normal distribution
15. If X has a uniform distribution in [0 , 1] , find the distribution (pdf) of $-2\log X$. Identify the distribution also.
16. Prove that the sum of independent gamma variates is also a gamma variate.
17. Derive the sampling distribution of sample mean from a normal population.
18. State and prove Central limit theorem for iid random variables.

PART-C

ANSWER ANY **TWO** QUESTIONS

(2 x 20 = 40 marks)

19. a) Define **Marginal** distributions, conditional distributions, Correlation Coefficient. (10)

b) Given **Joint distribution** of X and Y is given by

$$f(x,y) = 4xye^{-(x^2+y^2)}; x \geq 0, y \geq 0 \text{ test whether X and Y are independent.} \quad (10)$$

20. Derive the four central moment of Poisson distribution using any method.

21. (a) In a distribution exactly normal, 10.03% of the items are under 25 kilograms weight and 89.97% of the items are under 70 kilogram weight. What are the mean and standard deviation of the distribution ?

(b) Derive the pdf of t-distribution.

22. Obtain the limiting distribution of the nth order statistic based on a sample of size n drawn from $U(0, \Theta)$, $\Theta > 0$.

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