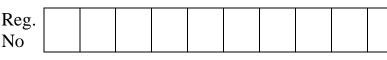
QP Code: RD19MSC085
---------------------

No





GIET UNIVERSITY, GUNUPUR – 765022 M. Sc(Third Semester) Examinations, December' 2020 MTOE 308/AE 307 – MATHEMATICAL STATISTICS – II (Mathematics)

Time: 2hrs

Maximum: 50 Marks

#### (The figures in the right hand margin indicate marks.)

- Q.1. Answer ALL the questions
  - a. Find the mean of uniform distribution.
  - b. Define exponential distribution.
  - c. Let (x, y) have a joint probability function  $f_{x,y} = 2$  0 < x < y < 1. Find the marginal probability distribution
  - d. If X,Y are independent random variables then prove that E[XY] = E(X)E(Y).
  - Define iid random variable. e.
  - Write the conditions for orthogonality of two random variables. f.
  - If  $X_1$  is a binomial random variable with n=3 and p=1/2 then find  $M_{X_1}(t)$ . g.
  - Let X be a continuous random variable with pdf h.

 $f(x) = 3(1-x)^2$  for 0 < x < 1. What is the pdfof  $Y = (1-X)^3$ ?

- Write the difference between multiple & partial correlation. i.
- Write the hierarchy of convergence. į.

# PART – B

### $(6 \times 5 = 30 \text{ Marks})$

### Answer ANY FIVE questions

- 2. Find the m.g.f of gamma distribution. Hence find the mean and variance.
- 3. For a beta distribution with density  $f(x) = \frac{1}{B(p,q)} (1-x)^{p-1} x^{q-1}, 0 < x < 1, p > 0, q > 0.$ (6)Verify that the harmonic mean is less than the arithmetic mean.
- 4. Let X,Y be the jointly continuous random variables with joint PDF (6)

$$f_{XY}(x,y) = \begin{cases} x + cy^2 , & 0 \le x \le 1, & 0 \le y \le 1 \\ 0 & & 0 \text{ therwise.} \end{cases}$$

- Find the constant C. (i)
- Find  $P(0 \le X \le \frac{1}{2}, 0 \le Y \le \frac{1}{2})$ (ii)
- 5. Suppose a coin is tossed 3 times and let  $X_1$  denotes the number of heads we get in three (6)tosses. Also let a second coin is tossed two times and let  $X_2$  denotes the number of heads we got in those two tosses. Let  $Y = X_1 + X_2$  denotes the number of heads in five tosses. What is the probability distribution of Y.

Marks

(6)

 $(2 \times 10 = 20)$ 

# 6. Find the expression for marginal $pmfP_x(x)$ and $P_y(y)$ .

Consider the joint pmf of X,Y as follows.

	0	1	2
Y→			
$\begin{array}{c} \mathbf{Y} \rightarrow \\ X \downarrow \end{array}$			
0	1/6	1/4	1/8
1	1/8	1/6	1/6

- (a) Find  $P(X = 0, Y \le 1)$
- (b) Find marginal PMFs of X,Y
- (c) Find P(Y = 1 | X = 0)
- 7. Suppose  $X_1, X_2$  are independent random variable with parameter  $\lambda = 1$  so that, (6)

$$\begin{split} f_{X_1}(x_1) &= e^{-x_1} \ , \ 0 < x_1 < \infty \\ f_{X_2}(x_2) &= e^{-x_2} \ , \ 0 < x_2 < \infty \end{split}$$

Using transformation  $Y_1 = X_1 - X_2$  find the joint distribution of  $Y_1$ .

- 8. State and prove central limit theorem
- 9. Let X & Y be two jointly continuous random variable with joint PDF,

$$F_{x,y}(x,y) = \begin{cases} \frac{3}{2}x^2 + y, & 0 < x, y < 1\\ 0, & otherwise \end{cases}$$

And the random vector 'U' be defined by  $U = \begin{pmatrix} x \\ y \end{pmatrix}$ , find the correlation & covariance matrices of 'U'

(6)

(6)

(6)