

(This question paper contains 3 printed pages)

**S.No. of Question Paper**

**Unique Paper Code** : **32371208\_OC**

**Name of the Course** : **B.Sc. (H) Statistics Under CBCS**

**Name of the Paper** : **Probability and Probability Distributions**

**Semester** : **II**

**Duration** : **3 hours**

**Max. Marks** : **75**

**Instructions for candidates**

*Attempt 4 questions in all.*

*All questions carry equal marks.*

1. The distribution of a r.v.  $X$  in the range  $(0,2)$  is defined by:

$$f(x) = \begin{cases} 3x^3; & 0 < x \leq 1 \\ (2-x)^3; & 1 < x \leq 2 \end{cases}$$

Calculate mean, standard deviation and mean deviation about mean of the distribution.

2. The two dimensional continuous random variable  $(X, Y)$  has joint p.d.f.

$$f(x, y) = \begin{cases} k e^{-(x+y)}; & 0 \leq y < x < \infty \\ 0 & ; \text{ elsewhere} \end{cases}$$

Find the following:

- (i) constant  $k$ , (ii) Marginal p.d.f. of  $X$ , (iii) distribution function of  $X$ ,  
(iv)  $P(X < 5)$ , and  $P(Y > \frac{1}{2} | X < 1)$ . Also comment on the independence of  $X$  and  $Y$ .
3. Let  $X$  and  $Y$  be independent random variables having exponential distribution with same parameter  $\theta$ . Find m.g.f of  $X$  and  $Y$ . Hence find the distribution of  $Z = X + Y$  and identify it. What is the mean and variance of  $Z$ ?
4. A bag contains 6 white and 3 black balls. Balls are drawn one by one without replacement until a black ball is drawn. If  $0, 1, 2, 3, \dots$ , white balls are drawn before the first black, a man is to receive  $0^4, 1^4, 2^4, 3^4, \dots$ , rupees respectively. Find his expectation.
5. Let  $X \sim N(\mu, \sigma^2)$ . Find the p.d.f of the following random variables:  
(i)  $Y = |X|$ .  
(ii)  $Z = 2Y + 3$ .  
Also find  $E(Y)$  by using m.g.f. of  $X$ .
6. Let  $X$  and  $Y$  be independent Gamma variates with parameters  $(\lambda, a)$  and  $(\lambda, b)$  respectively.
- (i) Show that  $E\left(\frac{X}{X+Y}\right) = \frac{E(X)}{E(X+Y)}$
- (ii) Find the distribution of  $\frac{X}{Y}$  and identify it.



This document was created with the Win2PDF "print to PDF" printer available at <http://www.win2pdf.com>

This version of Win2PDF 10 is for evaluation and non-commercial use only.

This page will not be added after purchasing Win2PDF.

<http://www.win2pdf.com/purchase/>