



PO-420-427 Seat No. \_\_\_\_\_

**B. Sc. (Sem. IV) Examination**

April / May - 2016

**1. ESMAT-22 : Business Mathematics - II**

**2. ES-31 : Business Mathematics - III**

Time : 2 Hours]

[Total Marks : 50

**1. ESMAT-22 : Business Mathematics - II**

- 1 (a) For two events  $A$  and  $B$  prove that 5  
$$P(A \cap B) = P(A) \cdot P(B/A)$$

OR

- (a) If  $A$  and  $B$  are events such that  $A \subset B$  then 5  
prove that

(i)  $P(B - A) = P(B) - P(A)$

(ii)  $P(A) \leq P(B)$ .

- (b) Attempt any **four** : 20

- (i) Find the probability of obtaining two heads in the toss of two unbiased coins when

(a) at least one of the coins shows a head

(b) second coin shows a head

- (ii) A bag contains 12 white and 8 red balls. If four balls are taken one after the other from the bag.

(a) without replacement

(b) with replacement

Find the probabilities that they are alternatively of different colour.

(iii) Two unbiased dice are tossed. Let  $w$  denotes the number on the first die and  $r$  denote the number on the second die. Let  $A$  be the event that  $w + r \leq 4$  and  $B$  be the event that  $w + r \leq 3$ . Are  $A$  and  $B$  independent ?

(iv) A box contains 5 red, 6 white and 2 black balls. The balls are identical in all respect other than colour.

(a) One ball is drawn from the box. Find the probability that the selected ball is black.

(b) Two balls are drawn at random from the box. Find the probability that one ball is white and one is red.

(v) If  $P(A) = \frac{1}{3}$ ,  $P(B) = \frac{1}{4}$  and

$P(A \cap B) = \frac{1}{6}$  then find  $P(A \cup B)$ ,

$P(A' \cap B')$  and  $P(A'/B')$

(vi) The probability (i) that A can solve a problem in statistics is  $\frac{4}{5}$  (ii) that B can solve it is  $\frac{2}{3}$  (iii) that C can solve it is  $\frac{3}{7}$ . If all of them try independently, find the probability that the problem will be solved.

- (1) The screws produced by a certain machine were checked by examining samples of 12. The following table shows the distribution of 128 samples according to the number of defective items they contained

No. of defectives in a sample of 12	0	1	2	3	4	5	6	7	Total
No. of samples	7	6	19	35	30	23	7	1	128

Fit a binomial distribution and find the expected frequencies if the chance of screw being defective is  $\frac{1}{2}$ . Find the mean and variance of the fitted distribution.

- (2) The probability distribution of a random variable  $x$  as follows :

$x_i$	0	1	2	3	4
Probability	$\frac{1}{10}$	$P$	$\frac{3}{10}$	$P$	$\frac{1}{10}$

Find the value of  $P$  and  $E(x+1)$ .

- (3) In a distribution exactly normal. 7% of the items are under 35 and 89% are under 63. What are the mean and SD of the distribution?
- (4) The distribution of typing mistakes committed by a typist is given below. Assuming a Poisson model, find out the expected frequencies.

Mistakes per page	0	1	2	3	4	5
Number of pages	142	156	69	27	5	1

- (5) The probability that a bomb dropped from the plane will hit a target is  $\frac{2}{5}$ . Two bombs are enough to destroy a bridge. If 4 bombs are dropped on a bridge find the probabilities that
- (a) The bridge will be destroyed
  - (b) The bridge will be partially destroyed
- (6) The probability of a defective bolt is 0.2. Find
- (a) the mean and S.D. for the distribution of defective bolts in a total of 1000 and
  - (b) find the coefficient of skewness and kurtosis.
- (7) It is given that 3% of electric bulb manufactured by company are defective using Poisson approximation find probability that a sample of 100 bulbs will contain
- (a) no defective (b) exactly one defective.
- (8) A person tosses three coins simultaneously. He gets Rs. 5 if three heads appear, Rs. 3 if two heads appear, Rs 2 if one head appear. He has to pay a penalty of Rs. 10 if no head appear. Find his expected amount.

## 2. ES-31 : Business Mathematics - III

1 Attempt any **five** :

25

(1) Find the derivative of  $\tan^{-1} \frac{\sqrt{1+x^2}-1}{x}$  w.r. to  $x$ .

(2) If  $x^y = e^{x-y}$  then prove that  $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$ .

(3) Differentiate w.r. to  $x$  of function,  
$$y = \log \left[ e^x \cdot \left( \frac{x-2}{x+3} \right)^{3/4} \right].$$

(4) If  $y = \sin(x)^{\log x} + x^{\sin x}$  then find  $\frac{dy}{dx}$ .

(5) If  $x^3 + 5x^2y + yx = 5$  then find  $\frac{dy}{dx}$ .

(6) Find  $\frac{dy}{dx}$ , when  $x = a(t - \sin t)$ ,  $y = a(1 - \cos t)$ .

(7) Evaluate :  $\frac{d}{dx} \left[ \tan \left( \log \tan^{-1} \sqrt{x} \right) \right]$ .

2 Attempt any **five** :

25

(1) Evaluate :  $\int \frac{x^2 dx}{x^4 + 1}$ .

(2) Evalaute :  $\int \frac{dx}{5+4 \cos x}$ .

(3) Evalaute :  $\int \frac{x+1}{3+2x-x^2} dx$ .

(4) Evalaute :  $\int \frac{x^3}{(x^2+1)^3} dx$ .

(5) Evalaute :  $\int \frac{3x dx}{(x^2+k^2)^n}$ .

(6) Evalaute :  $\int \sqrt{1+\sin 2x} dx$ .

(7) Evalaute :  $\int \left(x-\frac{1}{3}\right)^3 dx$ .

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