TIME : 3 Hrs. | KL3AAN | **Marks : 30**

N.B :

1. All questions are compulsory.
2. Figures to the right indicate marks.
3. Statistical tables will be provided on request.

Q.1 **Solve any THREE questions from the following: -**

a) Two cards are drawn at random from a pack of 52 well shufled playing cards. Find the probability that the two cards drawn are :-
   i) of same suit
   ii) of same denomination
   iii) one hearts card   [5]

b) Find K for the following case so that p(x) can be regarded as probability distribution function.

X	-2	-1	0	1	2
P (X)	$\frac{K+1}{15}$	$\frac{1}{15}$	$\frac{K}{15}$	$\frac{K-4}{15}$	$\frac{2}{15}$

Also find E(x) and variance of x.   [5]

c) Following is the joint probability distribution of x and y

X/Y	2	3	4
0	0.02	0.08	0.10
1	0.03	0.12	0.15
2	0.05	0.20	0.25

Obtain (i) Marginal probability distributions of x and y
(ii) Find cov (x, y). Are x and y correlated.   [5]

d) A has won 20 out of 30 games of chess with B. In a new series of 6 games, what is the probability that A would win :-   [5]
   i) only four games
   ii) four or more games
   iii) None of the games

e) In a factory bolts are packed in boxes of 500 each. It is known that on an average 0.1% of the bolts are defective. What is the chance that one such box consists of (i) no defective
(ii) one defectives
(iii) two or more defectives'
(Given $e^{-0.5} = 0.6065$, $e^{-0.1} = 0.90484$)   [5]

Q.2 **Solve any THREE questions from the following :-**

a) For a continuous random variable x its p.d.f. is given by

$$f(x) = kx(2-x) \quad ; \quad 0 \leq x \leq 2$$
$$= 0 \qquad \qquad \text{otherwise}$$

Find k. Also find Mean. [5]

b) The mileage (in thousands of miles) which car owner gets with a certain kind of tyres is a random variable having probability density function.

$$f(x) = \frac{1}{20} \, e^{-x/20} \quad ; \text{ for } x > 0$$

$$= 0 \qquad \qquad \text{Otherwise}$$

Find the probability that one of these tyres will last for

i) atmost 10,000 miles.

ii) anywhere from 15,000 to 25,000 miles. [5]

c) The income distribution of a group of 10,000 persons was found to be normal with mean Rs. 750 per month and standard deviation Rs. 50/- p.m. what percentage of this group had income (i) exceeding Rs. 668/- ii) exceeding Rs. 832/- (iii) Between Rs. 668/- and Rs. 832/- [5]

d) It is found that 10% of the days are foggy in a certain district . A sample of 900 days is taken from the meterological records of the district. Find the probability that :-

i) at least 100 days are foggy

ii) not more than 120 days are foggy. [5]

e) A pharmaceutical firm maintains that the mean time for a drug to show effect is 24 minutes. In a sample of 400 trials the mean time is 26 minutes with a standard deviation of 4 minutes. Test the hypothesis that the mean time is 24 minutes against the alternative that it is not equal to 24 minutes. Use a level of significance of 0.05. [5]

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