

Total No. of Questions : 12]

SEAT No. :

P5523

[Total No. of Pages : 3

[5672]-1005

**F.Y.MCA (Engineering)
PROBABILITY & STATISTICS
(2013 Pattern) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates.

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*

Q1) a) 1 card is drawn at random from the pack of 52 cards. **[4]**

- i) Find the probability that it is an honor card.
- ii) It is a face card.

b) State and prove Baye's theorem. **[4]**

OR

Q2) a) A problem is given to three students whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved? **[4]**

b) A certain company encourages its employees to participate in football and hockey. A survey indicates that 40% play football and 50% play hockey and 25% play football and hockey both. Find the probability of the event that. **[4]**

- i) an employee plays only hockey.
- ii) an employee plays only football.
- iii) an employee plays at least one game.

Q3) a) Find mean and variance of Binomial Random Variables. **[4]**

b) What is discrete random variable? If X is a discrete random variable having the following probability distribution. **[4]**

X	-1	0	2	3
P[X=x]	2/5	4/10	1/2	3/8

Find the probability mass function of

- i) $3X-2$
- ii) $2X+3$

P.T.O.

OR

Q4) a) A discrete random variable has probability function : $p(x) = (\frac{1}{3})^x$ where $x = 1, 2, \dots$ find. [4]

- i) the mode
- ii) the median
- iii) compare them with the mean

b) Let X be a discrete random variable with probability mass function. [4]

$$P[X=x] = \frac{x^2}{30}, \{x=0, 1, 2, 3, 4\}$$
$$= 0 \text{ otherwise}$$

Find the median and mode of X .

Q5) a) Find moment generating function, mean and variance of Chi-square Random Variable. [6]

b) Prove : $\text{COV}[X, Y] = E[XY] - \{E[X] \cdot E[Y]\}$ [3]

OR

Q6) a) $F_{xy}(x, y) = 1/240$ $8.5 < x < 10.5$ [6]
 $124 < y < 245$

Find

- i) $E[X]$
- ii) $E[Y]$
- iii) $E[XY]$

b) Write short note on Weibull Distribution. [3]

Q7) a) What is statistical probability? What are the characteristics of statistical probability? [4]

b) X is poisson random variable with parameter K . A random sample of size 4 is obtained from the distribution of x . $x_1 = 12$, $x_2 = 15$, $x_3 = 16$, $x_4 = 17$. Determine the value of K that gives the highest probability of observing this sample. [4]

OR

Q8) a) What is point estimator? What properties of estimator will make it a good estimator? [4]

b) Describe Central limit theorem. [4]

- Q9) a)** What is Hypothesis testing? Explain the advantages of hypothesis testing. [4]
- b)** Find mean, Variance & standard Deviation for population 5,8,11,14,19,22 by drawing the sample of 2 with replacement & without replacement. [4]

OR

- Q10) a)** Explain the following Terms: [4]
- interval estimation.
 - student -t Distribution.
 - Confidence Limit
 - P-value Test.
- b)** Explain the following Terms: [4]
- Type I & Type II Errors.
 - Level of Significance.

- Q11) a)** Explain $r * c$ Test for Independence. [5]
- b)** Explain the procedure to draw R chart. [4]

OR

- Q12) a)** Explain Statistical Quality Control(SQC) with its limitation and examples. [4]
- b)** Use Chi-square Test to determine goodness of fit of data given below. $(\chi^2_{table}(0.95)=9.49)$ [5]

No of Heads (x)	P(x heads)	Expected Frequency	Observed Frequency
0	0.0332	33.2 or 33	38
1	0.1619	161.9 or 162	144
2	0.3162	316.2 or 316	342
3	0.3087	308.7 or 309	287
4	0.1507	150.7 or 151	164
5	0.0292	29.2 or 29	25

