(6 pages)

OCTOBER 2011 **P/ID 17406/RBG**

Time : Three hours Maximum : 75 marks

Use of statistical table is permitted.

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

All questions carry equal marks.

1. (a) A and B are two events with $P(A) = \frac{3}{8}$, $P(B) = \frac{5}{8}$ and $P(A \cup B) = \frac{3}{4}$. Find $P(A \mid B)$ and $P(B \mid A)$. Check whether A and B are independent.

Or

(b) A random variable X has the following probability distribution.

X:	1	2	3
$P(X = x)$:	1/2	1/3	1/4

Find $E(x)$ and $Var(x)$.

2. (a) Determine the binomial distribution whose mean is 9 and whose standard deviation is 3/2.

Or

(b) Give a brief account of the properties of a normal curve.

3. (a) Calculate the correlation coefficient from the following data :

x :	12	9	8	10	11	13	7
y :	14	8	6	9	11	12	3

Or

(b) Fit a straight line to the following data :

x :	0	1	2	3	4
y :	1	1.8	3.3	4.5	6.3

4. (a) Distinguish between a population and a sample. What is a random sample? Describe some methods of drawing random sample from a finite population.

Or

(b) A random sample of size 100 has mean 15, the population variance being 25. Find the interval estimate of the population mean with a confidence level of

(i) 99% and

(ii) 95%.

5. (a) The standard deviation calculated from two random samples of sizes 9 and 13 are 2.1 and 1.8 respectively. Can the samples be regarded as drawn from the normal populations with the same standard deviation? The value of F from the table with degrees of freedom 8 and 12 is 2.85.

Or

(b) What are the components of a time series? How will you determine them?

PART B — ($5 \times 10 = 50$ marks)

Answer any FIVE questions.

All questions carry equal marks.

6. A factory has two machines A and B. Past records show that machine A produces 30% of the total output and machine B the remaining 70%. Machine A produces 5% defective items and machine B produces 1% defective items. An item is drawn at random and found to be defective. What is the probability that it was produced

(a) by machine A

(b) by machine B?

7. A random variable X has the probability function $P(x) = \frac{1}{2^x}; x = 1,2,3...$ Find its

   (a) Moment generating function

   (b) Mean and

   (c) Variance.

8. The buses on a certain route run after every 25 minutes. If a person arrives at the bus stop at random, what is the probability that

   (a) he has to wait between 10 to 15 minutes?

   (b) he gets a bus within 5 minutes?

   (c) he has to wait at least 15 minutes?

9. The distribution of the number of road accidents per day in a city is Poisson with mean 4. Find the number of days out of 100 days when there will be

   (a) no accident

   (b) at least 2 accidents and

   (c) atmost 3 accidents.

10. Two variables gave the following data :

$\overline{X} = 20$, $\overline{Y} = 15$, $\sigma_x = 4$, $\sigma_y = 3$, $\gamma = 0.7$. Obtain the regression equations and find the most likely value of Y when $X = 24$.

11. Calculate the rank correlation from the following data :

x :	68	64	75	50	64	80	75	40	55	64
y :	62	58	68	45	81	60	68	48	50	70

12. In a survey of 200 boys, of which 75 were intelligent, 40 has skilled fathers, while 85 of the unintelligent boys had unskilled fathers. Do these support the hypothesis that skilled fathers have intelligent boys? Use χ^2 test. Value of χ^2 for 1-degree of freedom at 5% level is 3.84.

13. Set up ANOVA for the following per hectare yield for three varieties of wheat, each grown on four plots.

Plot of land	Variety of wheat			
	A_1	A_2	A_3	Total
1	6	5	5	16
2	7	5	4	16
3	3	3	3	9
4	8	7	4	19
Total	24	20	16	60
