

Register No: .....

**B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2011**

Fourth Semester

**U07MA402: PROBABILITY AND APPLIED STATISTICS**

(Common to Information Technology, Fashion Technology, Textile Technology)

**Time: Three Hours**

**Maximum Marks: 100**

**Answer All the Questions:-**

**PART A (10 x 1 = Marks)**

1. Median = \_\_\_\_\_.

- a) Size of  $N^{\text{th}}$       b) Size of  $\frac{N+1}{2}^{\text{th}}$       c) Size of  $\frac{N-1}{2}^{\text{th}}$       d) Size of  $\frac{N}{2}^{\text{th}}$

2. The minimum and maximum values between which correlation coefficient lies are

- a) -1 and 0      b) -1 and 1      c) 0 and 1      d)  $-\infty$  and  $\infty$

3. If a balanced coin flip twice then the probability of getting at least one head is

- a)  $\frac{3}{4}$       b)  $\frac{1}{4}$       c)  $\frac{4}{3}$       d) 1

4. If  $\text{var}(x)=4$ , then  $\text{var}(3x+8)$ , Where X is a R.V.

- a) 63      b) 36      c) 64      d) 9

5. The mgf of uniform distribution.

- a)  $\frac{e^{bt}}{b-a}$       b)  $\frac{e^{bt}-e^{at}}{(b-a)t}$       c)  $\frac{e^{bt}+e^{at}}{(b-a)t}$       d)  $\frac{e^{bt}+e^{at}}{(b-a)}$

6. The mean of a binomial distribution is 4 and variance is 3 then value of n is

- a) 10      b) 16      c) 20      d) 12

7. The calculated value of  $\chi^2$  is always

- a) positive      b) negative      c) zero      d) none

8. The range of F distribution is \_\_\_\_\_

- a)  $-\infty$  to  $\infty$       b)  $-\infty$  to 1      c) 1 to  $\infty$       d) -1 to 1

9. The sum of the squares between samples is denoted by

- a) SSC      b) SSS      c) SSE      d) None

10. In  $4 \times 4$  Latin square, the total of such possibilities are

- a) 8      b) 104      c) 24      d) 576

**PART B (10 x 2 = 20 Marks)**

11. Write the relation between mean, median and mode.

12. Write the two regression lines.

13. State the axioms of probability.
14. Write any two properties of probability of distribution function.
15. If  $X$  is a poisson variable and if  $P(X=1) = P(X=2)$ . find the value of the parameter  $\lambda$ .
16. Write down the mgf of the exponential distribution and hence find its mean.
17. For a 2 X 2 contingency table  $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$  write down the corresponding  $\chi^2$  value.
18. Write any two properties of t distribution.
19. What are the uses of analysis of Variance?
20. Name the basic principle of experimental design.

**PART C (5 x 14 = 70 Marks)**

21. a) The table below gives the weight measurements of 200 castings

Weight in kg	No. of castings	Weight in kg	No. of castings
81-90	2	141-150	37
91-100	5	151-160	29
101-110	13	161-170	11
111-120	20	171-180	3
121-130	30	181-190	1
131-140	49		

Calculate arithmetic mean, median, mode and standard deviation.

**(OR)**

- b) (i) Find Karl Pearson 's correlation co-efficient between  $X$  and  $Y$  from the following data

x:	78	89	97	69	59	79	61	61	(7)
y:	125	137	156	112	107	136	123	108	

- (ii) The equations of two regression lines obtained in a correlation analysis are as follows  $3x + 12y = 19$ ;  $3y + 9x = 46$  obtain (i) the value of correlation co-efficient (ii) mean value of  $x$  and  $y$ . (7)

22. a) (i) If  $A$  and  $B$  are independent events then (7)
- $\bar{A}$  and  $B$  are independent
  - $\bar{A}$  and  $\bar{B}$  are independent.

- (ii) An urn A contains 4 white and 5 black balls, a second urn B contains 5 white and 4 black balls. 1 ball is transferred from the first to the second urn, then a ball is drawn from the second urn. What is the probability that it is white. (7)

(OR)

- b) (i) If the random variable  $X$  takes the values 1,2,3,4 such that  $2P(X=1)=3P(X=2)=P(X=3)=5P(X=4)$  Find the probability distribution and the cumulative distribution function of  $X$ . (7)

- (ii) A continuous random variable  $X$  has the pdf  $f(x) = kx^2 e^{-x}$ ,  $x \geq 0$ . Find  $k$ , mean and variance. (7)

23. a) (i) Six dice are thrown 729 times. How many times do you expect atleast 3 dice show a 5 or 6 (6)

- (ii) Find the mgf, mean and variance of geometric distribution. (8)

(OR)

- b) (i) Find the MGF of Binomial distribution. (7)

- (ii)  $X$  is a normal variate with mean 30 and standard deviation 5. Find the following

1.  $P(26 \leq X \leq 40)$  2.  $P(X \geq 45)$ . (7)

24. a) (i) 400 workers were selected at random from a district. Their mean income was Rs 140.50 per month with standard deviation of Rs 25.20. Do you believe that the average income of the workers community in the district is Rs 150?

- (ii) Two samples of sizes 9 and 8 give the sum of the squares of deviations from their respective means equal to 160 and 91 respectively. Can the samples be regarded as drawn from the same normal population.

(OR)

- b) (i) A coin is tossed 400 times and it turns up head 216 times. Discuss whether the coin may be regarded as unbiased one. (7)

- (ii) The following table gives the number of aircraft accidents that occurred during the various days of the week. Test whether the accidents are uniformly distributed over the week (7)

Days:	Mon	Tue	Wed	Thu	Fri	Sat	Total
No. of Accidents	14	18	12	11	15	14	84

25. a) Five doctors each test treatments for a certain disease and observe the number of days each takes to recover. The results are as follows (Recovery time in days)

Doctor	Treatment				
	1	2	3	4	5
A	10	14	23	19	20
B	11	15	24	17	21
C	9	12	20	16	19
D	8	13	17	17	20
E	12	15	19	15	22

Discuss the difference between doctors and treatments.

**(OR)**

b) Analyse the variance in the following latin square of yields (in kgs) of paddy where A, B, CD denote the different methods of cultivation.

D122 A121 C123 B122

B124 C123 A122 D125

A120 B119 D120 C121

C122 D123 B121 A122

Examine whether the different methods of cultivation have given significantly different yields.

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