



B.E DEGREE EXAMINATIONS:APRIL/MAY 2016

(Regulation 2013)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U13MAT605: Probability and Applied Statistics

(Use Statistical tables wherever necessary)

Time: Three Hours

Maximum Marks: 100

Answer all the Questions

PART A (10 x 1 = 10 Marks)

1. The minimum and maximum values between which correlation coefficient lies are
 - a) -1 and 1
 - b) 0 and 1
 - c) -1 and 0
 - d) 1 and 2
2. Algebraic sum of the deviation of the set of values from their mean is
3. If x is a random variable then $\text{Var}(ax+b)$ is
 - a) $\text{Var}(ax)+b$
 - b) $a\text{Var}(x)$
 - c) $a^2\text{Var}(x)$
 - d) $\text{Var}(x)+b$
4. Probability density function $f(x)$ can be used to describe the probability of arandom variable x .
5. For the normal distribution,skewness is
 - a) Non symmetrical
 - b) Symmetrical
 - c) Zero
 - d) Nonzero
6. The variance of the binomial distribution is.....
7. The range of t- distribution is
 - a) $-\infty$ to ∞
 - b) 0 to ∞
 - c) 1 to ∞
 - d) 2 to ∞
8. The chi-square test is a non-parametric test. Say True or False
9. \bar{X} and R charts are used to find out
 - a) Production control
 - b) Cost control
 - c) Process control
 - d) Material control
10. Latin squares are most widely used in the field of.....

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Write the formula for coefficient of variation.
12. Define rank correlation.
13. Write the axioms of probability.
14. State Baye's theorem.
15. Write any two properties of normal distribution.
16. If $X \sim B\left(10, \frac{1}{2}\right)$, find the mean of the Binomial random variable.
17. What is Type I error and Type II error?
18. Define student's t-test
19. What are the basic principles in the design of experiment?
20. What is meant by natural tolerance of the process?

PART C (5 x 14 = 70 Marks)
(Answer not more than 400 words)

Q.No. 21 is Compulsory

21. Four varieties A, B, C, D of a fertilizer are tested in a Latin square design with 4 replication. The plot yields in pounds are as follows.

A	12	D	20	C	16	B	10
D	18	A	14	B	11	C	14
B	12	C	15	D	19	A	13
C	16	B	11	A	15	D	20

Perform an analysis of variance and state your conclusions.

22. (a) (i) Find Karl Pearson's coefficient of correlation from the following data: (7)

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

- (ii) Compute the median of the following series: (7)

Size	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
f	20	24	32	28	20	16	34	10	8

(OR)

- (b) (i) The two lines of regression are (7)
- $$8x - 10y + 66 = 0 \text{ and}$$
- $$40x - 18y - 214 = 0$$

Find i) the mean values of x and y ii) correlation coefficient between x and y .

- (ii) Calculate the mean and standard deviation from the following data: (7)

Value	90-99	80-89	70-79	60-69	50-59	40-49	30-39
f	2	12	22	20	14	4	1

23. (a) (i) A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag B. (7)

- (ii) If the density function of a continuous r. v. 'X' is given by (7)

$$f(x) = \begin{cases} ax, & 0 \leq x \leq 1 \\ a, & 1 \leq x \leq 2 \\ 3a - ax, & 2 \leq x \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

- (i) Find the value of 'a'. (ii) Find the cdf of 'X'.

(OR)

- (b) (i) A random variable 'X' has the following probability function. (7)

X	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

- (i) Determine the value of 'a'
- (ii) Find $P(X \geq 3)$, $P(0 < X < 5)$.
- (iii) Find the distribution function of X.
- (ii) Find the m.g.f. of the random variable 'X' having p.d.f. (7)

$$f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 < x < 2 \\ 0, & \text{otherwise} \end{cases}$$

Find the Mean and Variance.

24. (a) (i) Find the MGF of a normal distribution. (7)
(ii) Fit a poisson distribution to the following data: (7)

Deaths	0	1	2	3	4
Frequency	122	60	15	2	1

(OR)

- (b) (i) The weekly wages of 1000 workmen are normally distributed around a mean of Rs. 70 with a S.D. of Rs. 5. Estimate the number of workers whose weekly wages will be (i) between Rs. 69 and Rs. 72, (ii) less than Rs. 69, (iii) More than Rs. 72. (7)
- (ii) Derive MGF, mean and variance of the binomial distribution. (7)
25. (a) The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	
Sample B	27	30	28	31	22	36

Can it be said that two samples come from same normal population.

(OR)

- (b) Given the following contingency table for hair colour and eye colour. Find the value of Chi-square. Is there good association between the two.

		Hair Colour			Total
		Fair	Brown	Black	
Eye Colour	Blue	15	5	20	40
	Grey	20	10	20	50
	Brown	25	15	20	60
	Total	60	30	60	150
