



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 154314**

Roll No.

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### B. Tech.

(SEM. III) (ODD SEM.) THEORY

EXAMINATION, 2014-15

**ELEMENTARY MATHEMATICS - III**

Time : 3 Hours]

[Total Marks : 100

- Note :**
- (1) Attempt all questions. Each question carries equal marks.
  - (2) Required tables will be provided.

1 Attempt any four parts of the following :  $4 \times 5 = 20$

(a) Define any two methods of graphical representation of data.

(b) Find the mean deviation from the median for the data :

$x_i$	15	21	27	30	35
$f_i$	3	5	6	7	8

(c) For two random variables,  $x$  and  $y$  with same mean, the Regression equations are

$$y = ax + b \text{ and } x = \alpha y + \beta.$$

Show that  $\frac{b}{\beta} = \frac{1-a}{1-\alpha}$ . Find also the common mean.

- (d) Six coins are tossed 6400 times. Using the Poisson distribution, determine the Approximate probability of getting six heads  $x$  times .
- (e) The first four moments about working mean 28.5 of a distribution are 0.294, 7.144, 42.409 and 454.98 . Calculate the moments about the mean. Also Evaluate  $\beta_1, \beta_2$  and comment upon the skewness and kurtosis of the distribution.
- (f) Find the coefficient of correlation between the values of  $x$  and  $y$  :

x	1	3	5	7	8	10
y	8	12	15	17	18	20

2 Attempt any two questions : 10×2=20

- (a) A husband and wife appear in an interview for two vacancies In the same post. The probability of husband's selection is  $1/7$  and that of wife's selection is  $1/5$ . What is the probability that (i) both of them will be selected (ii) only one of them will be selected, and (iii) none of them will be selected ?
- (b) Find the measures of skewness and kurtosis on the basis of moments for The following distribution :

x	1	3	5	7	9
f	1	4	6	4	1

- (c) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of The distribution. It is given that if

$$f(t) = \frac{1}{\sqrt{2\pi}} \int_0^t e^{-\frac{1}{2}x^2} dx \text{ then } f(0.5) = 0.19 \text{ and } f(1.4) = 0.42.$$

3 Attempt any two questions : 10×2=20

- (a) Calculate the coefficient of correlation between the following ages of Husband ( $x$ ) and wife ( $y$ ) by taking 30 and 28 as assumed mean in case of  $x$  and  $y$  respectively :

x	24	27	28	28	29	30	32	33	35	35	40
y	18	20	22	25	22	28	28	30	27	30	32

- (b) Two lines of regression are given by  $x + 2y - 5 = 0$  and  $2x + 3y - 8 = 0$  and  $\sigma^2 x = 12$ , calculate : (i) the mean value of  $x$  and  $y$ , (ii) variance of  $y$ , (iii) the coefficient of correlation between  $x$  and  $y$ .
- (c) The height of 6 randomly chosen sailors in inches are 63, 65, 68, 69, 71 and 72. Those of 9 randomly chosen soldiers are 61, 62, 65, 66, 69, 70, 71, 72 and 73. Test Whether the sailors are on the average taller than soldiers.

4 Attempt any two questions : 10×2=20

- (a) A manufacturing company purchased three new machines of different makes and Wishes to determine whether one of them is faster than the others in producing A certain output. Five hourly production figures are observed at random from Each machine and results are given below:

Observations	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>
1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

Use ANOVA and determine the machines are significantly different in their mean Speed.

(Given: at 5% level,  $F_{2, 12} = 3.89$ )

- (b) The probability of any ship of a company being destroyed on a certain voyage is 0.02. The company owns 6 ships for the voyage. What is the probability of :
- (i) losing one ship
  - (ii) losing at most two ships
  - (iii) losing none ?
- (c) A die is thrown 90 times with the following results:

Face :	1	2	3	4	5	6	Total
Frequency :	10	12	16	14	18	20	90

Use  $\chi^2$ -test to test whether these data are consistent with the hypothesis That die is unbiased. Given  $\chi_{0.05}^2 = 11.07$  for 5 degrees of freedom.

- 5 (a) (i) Determine the control limits for  $\bar{X}$  and R charts  
if  $\sum \bar{X} = 357.50$ ,  $\sum R = 9.90$   
Number of subgroups = 20. It is given  
that  $A_2 = 0.18$ ,  $D_3 = 0.41$ ,  $D_4 = 1.59$  and  $d_2 = 3.736$ . Also find the process capability.
- (ii) What is objectives of control charts?
- (b) (i) Define techniques of statistical quality control.  
What are objectives of control charts ?
- (ii) Define P chart and np chart.
- (c) What is Randomized block design? Discuss its analysis of variance table.