Printed Page:- **Subject Code**:- **AAS0402**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - CARRY OVER THEORY EXAMINATION - APRIL 2023

Subject: Engineering Mathematics- IV

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **20**

1. Attempt all parts:-

1-a. Which of the following is type of correlation…. (CO1) 1

(a) Positive Correlation

(b) Perfect Correlation

(c) Negative Correlation

(d) All the above

1-b. Find the mean of the following data: (CO1) 1

15, 20, 30,22,25,18,40,50,55 and 65

(a) 24

(b) 34

(c) 26

(d) 65

1-c. The test statistic of the mean of a small random sample of size n with standard deviation s from population with mean μ is given by : (CO2) 1

(a)

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$$\frac{\bar{x}-\mu}{s/\sqrt{n}}$$

(b) $\frac{\bar{x}-\mu}{s/n}$

(c) $\frac{\bar{x}-\mu}{s/\sqrt{n-1}}$

(d) $\frac{\bar{x}-\mu}{s/(n-1)}$

1-d. A random sample of 900 members has mean 3.4cms. If it is reasonably regarded as a sample from a large population of mean 3.2cms and S.D. 2.3cms. If the tabulated value for this data is 1.96 at 5% level of significance. Then which is true: (CO2) 1

(a) Use t-test for single mean.

(b) Use z-test for double mean.

(c) H_0 is accepted.

(d) H_1 is accepted.

1-e. A continuous random variable X has the distribution function 1

$$F(x) = \begin{cases} 0, & x < 1 \\ k(x-1)^4, & 1 < x < 3 \\ 1, & x > 3 \end{cases}, \text{ then}$$

the value of k is: (CO3)

(a) 1/16

(b) 1/4

(c) 1/2

(d) 1/8

1-f. The values of speed of a car is an example of: (CO3) 1

(a) Continuous variable

(b) Discrete variable

(c) Absolute variable

(d) None of these

1-g. In Standard normal distribution, the value of mode is _____ (CO4) 1

(a) 2

(b) 1

(c) 0

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(d) any value

1-h. The shape of the Normal Curve is _____ (CO4) 1

(a) Bell Shaped

(b) Circular Shaped

(c) Spiked Shaped

(d) Spiral Shaped

1-i. The unit digit of 7^{73} is (CO5) 1

(a) 1

(b) 9

(c) 7

(d) None of these

1-j. If the scaling function Φ(t) is defined in the range [0,1] then Φ(2t) will be defined in: (CO5) 1

(a) [0,0.5]

(b) [0,2]

(c) [-2,0]

(d) None of these

2. Attempt all parts:-

2.a. Write down normal equations for curve $y = ax + bx^2$. (CO1) 2

2.b. If the critical value of Z is 1.96, find the significance level of two tailed test. (CO2) 2

2.c. Define probability density function. (CO3) 2

2.d. Out of 900 families with 5 children each find the expected number of families with at most 3 boys. (CO4) 2

2.e. What is the sum of first 12 perfect cubes? (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Find the mode from the following data: (CO1) 6

x	0-6	6-12	12-18	18-24	24-30	30-36	36-42
y	6	11	25	35	18	12	6

3-b. Find the normal equations to the curve $y = ax^2 + b$. (CO1) 6

3-c. In a factory producing spark plug, the number of defectives found in inspection of 20 lots of 100 each is given below: (CO2) 6

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Construct the p-chart and state whether the process is in statistical control.

3-d. A drilling machine bores holes with a mean diameter of 0.5230 cm and a SD of 0.0032 cm. Calculate the upper and lower control limits for means of 2σ and 3σ for sample size 4. (CO2) 6

3.e. A two dimensional random variable (X,Y) has a bivariate distribution given by: 6

$$P(X=x, Y=y)=\frac{x^2+y}{32} \text{ for } x=0,1,2,3 \text{ and } y=0,1$$

find the marginal distribution of X and Y. (CO3)

3.f. Define exponential distribution. Find the moment generating function for exponential distributions. (CO4) 6

3.g. Three news papers A,B and C are published in a certain city. It is estimated from a survey that of the adult population: 20% read A, 16% read B, 14% read C,8% read both A and B, 5% read both A and C, 4% read both B and C, 2% read all three. Find the probability what percentage read at-least one of the papers? (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Calculate mode of the following distribution: (CO1) 10

Wages	50-70	70-90	90-110	110-130	130-150	150-170	170-190	190-210	210-230
No. of workers	4	44	38	28	6	8	12	2	2

4-b. Find the moment coefficient of Skewness and kurtosis of the following data: (CO1) 10

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	10	20	40	20	10

5. Answer any <u>one</u> of the following:-

5-a. Explain the Control charts (i)P- Chart (ii) np-Chart (iii) C-Chart. (CO2) 10

5-b. A random sample of size 16 has 53 as mean. The sum of squares of the deviation from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? Also obtain the 95% confidence limits of the population mean. Given that the tabular value for 15 degree of freedom is 2.13 10

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at 5% LOS. (CO2)

6. Answer any <u>one</u> of the following:-

6-a. If pdf $f(x,y) = \begin{cases} 2-x-y, & 0 \le x \le 1,\ 0 \le y \le 1 \\ 0, & \text{elsewhere} \end{cases}$, then 10

Find: a) marginal distribution.
b) conditional density function.
c) cumulative density function. (CO3)

6-b. The joint pdf of two dimensional random variable (X,Y) is given by: 10

$$f(x,y) = \begin{cases} \frac{8}{9}xy, & 1 \le x \le y \le 2 \\ 0, & \text{elsewhere} \end{cases}$$ (CO3)

i) find the marginal density function of X and Y.
ii) find the conditional density function of Y given X=x and conditional density function of X given Y=y.

7. Answer any <u>one</u> of the following:-

7-a. Find the mean and variance of the Normal Probability distribution. (CO4) 10

7-b. The weekly wage of 2000 workmen is normally distribution with mean wage of Rs 70 and wage standard deviation of Rs 5. Estimate the number of workers whose weekly wages are: 10
(i) between Rs 70 and Rs 71
(ii) between Rs 69 and Rs 73
(iii) more than Rs 72
(iv) less than Rs 65 (CO4)

8. Answer any <u>one</u> of the following:-

8-a. Let A=R-{3} and B=R-{2}, consider the function f:A → B defined by $f(x) = \frac{x-2}{x-3}$. Is f one one and onto? justify your answer. (CO5) 10

8-b. There are 18 stations between Hyderabad and Bangalore. How many second class tickets have to be printed, so that a passenger can travel from any station to any other station? (CO5) 10

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