

SECOND MID TERM TEST - 2024

12 - STD

BUSINESS MATHS AND
STATISTICS

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Marks : 45

Time : 1.30 Hrs

PART - A

10 X 1 = 10

Answer all the questions.

- $\int_{-\infty}^{\infty} f(x)dx$ is always equal to
a) zero b) one c) $E(x)$ d) $f(x) + 1$
- Normal distribution was invented by
a) Laplace b) De- Moivre c) Gauss d) All the above
- An estimator is a sample statistic used to estimate a
a) population parameter b) biased estimate c) sample size d) census
- If C is a constant then $E(C)$ is
a) 0 b) 1 c) (fcc) d) c
- Using the standard normal table, the sum of the probabilities to the right of $Z = 2.18$ and the left of $Z = -1.75$ is
a) 0.4854 b) 0.4599 c) 0.0146 d) 0.0547
- The standard error of sample mean is
a) $\frac{\sigma}{\sqrt{2n}}$ b) $\frac{\sigma}{n}$ c) $\frac{\sigma}{\sqrt{n}}$ d) $\frac{\sigma^2}{\sqrt{n}}$
- $E[x - E(x)]^2$ is
a) $E(x)$ b) $E(x^2)$ c) $V(x)$ d) S.D(x)
- If $X \sim N(\mu, \sigma^2)$ the maximum probability at the point of inflection of normal distribution is
a) $\frac{1}{\sqrt{2\pi}} e^{-1/2}$ b) $\frac{1}{\sqrt{2\pi}}$ c) $\frac{1}{\sigma\sqrt{2\pi}} e^{-1/2}$ d) $\frac{1}{\sqrt{2\pi}}$
- A variable which can assume finite or countably infinite number of value is known as
a) continuous b) discrete c) qualitative d) none of these
- A of statistical individuals in a population is called a sample.
a) infinite set b) finite set c) finite set d) entire set

PART - II

Answer any 3 question. Q. no. 15 is compulsory.

3 X 2 = 6

- The following information is the probability distribution of successes.

No. of successes	0	1	2
Probability	$\frac{6}{11}$	$\frac{9}{22}$	$\frac{1}{22}$

- A fair coin is tossed 6 times. Find the probability that exactly 2 head occurs.
- A commuter train arrives punctually at a station 25 minutes. Each morning a commuter leave his house and causally walks to the train station. Let X denote the amount of time, in minutes that commuter waits for the train from the time he reaches the train station. It is known that the probability density function of X is

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$$f(x) = \begin{cases} \frac{1}{25}, & \text{for } 0 < x < 25 \\ 0, & \text{otherwise} \end{cases}$$

obtain and interpret the expected value of the random variable X.

14. Find the sample size for the give standard deviation 10 and he standard error with respect of sample mean is 3.
15. Mention two branches of statistical inferences.

PART - III

Answer any 3 questions. Q. No. 20 is compulsory.

3 X 3 = 9

16. The number of cars in a household is given below.

No. of cars	0	1	2	3	4
No. of household	30	320	380	190	80

Estimate the probability mass function verify P(x:) is a probability mass function/.

17. Write any 2 examples for poisson distribution.
18. A random variable X has the following probability function.

Value of X	0	1	2	3	4	5	6	7
P(x)	0	a	2a	2a	3a	a ²	2a ²	7a ² + a

Find a.

19. In a book of 520 pages, 390 typo graphical errors occur. Assuming poisson law for the number of errors per page find the probability that a random sample of 5 pages will contain no error.
20. Using the following Tippet's random number table.

2952	6641	3992	9792	7969	5911	3170	5624
4167	9524	1545	1396	7203	5356	1300	2693
2670	7483	3408	2762	3563	1089	6913	7991
0560	5246	1112	6107	6008	8125	4233	8776
2754	9143	1405	9025	7002	6111	8816	6446

Draw a sample of 10 three digit numbers which are even numbers.

PART - IV

Answer all the questions.

4 X 5 = 20

21. The probability density function of a random variable x is $f(x) = Ke^{-|x|}$, $-\infty < x < \infty$. Find the value of K and also find mean and variance for the random variable. (OR)
The mortality rate for a certain disease is 7 in 1000. What is the probability for just 2 deaths on account of this disease in a group of 400. (Given $e^{-(2.8)} = 0.06$)
22. Weights of fish caught by a traveller are approximately normally distributess with a mean weight of 2.25 Kg and a standard deviation of 0.25 kg. What percentage of fish weigh less than 2 kg? (OR)
A sample of 100 items, draw from a universe with mean value 4 and S.D 3, has a mean with mean value 4 and S.D 3, has a mean value 3.5. Is the difference in the mean significant at 0.05 level of significance?
23. Suppose the life in hours of a radio tube has the probability density function.

$$f_x = \begin{cases} e^{-x/100}, & \text{when } x \geq 100 \\ 0 & \text{when } x < 100 \end{cases}$$

Find the mean of the life of a radio tube. (OR)

Suppose A and B are two equally strong table tennis players. Which of the following two events is more probable.

a) A beats B events in 3 games out of 4 or . b) A beats B exactly in 5 games out of 8?

24. Determine the mean and variance of a discrete random variable, given its distribution as follows.

X = x	1	2	3	4	5	6
Fx(x)	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	1 (OR)

An ambulance service claims that it takes on the average 8.9 minutes to reach this claim, the agency which licenses ambulance service has then timed on 50 emergency calls getting a mean of 9.3 minutes with a standard deviation of 1.6 minutes. What can theory conclude at 5% level of significance