MYMENSINGH GIRLS' CADET COLLEGE
2ND TERM END EXAMINATION - 2025
CLASS: XII
STATISTICS (CREATIVE)
SECOND PAPER
[According to the Syllabus of 2026]
TIME – 2 hours & 35 minutes
FULL MARKS – 50

Subject Code: | 1 | 3 | 0 |

[**N.B.** – The figures of the right margin indicate full marks. Read the stems carefully and answer the associated questions. Answer any **FIVE** questions taking at least two questions from each group]

Group - A

1. $P(A|B) = \frac{1}{8}, P(A) = \frac{1}{2}, P(B) = \frac{1}{5}$

    (a) What is a compound event.   1

    (b) Find $P(A \cap B)$.   2

    (c) Find $P(A|\bar{B})$.   3

    (d) Are the probabilities $P(A|B)$ and $P(B|A)$ equal? Justify   4

2. **In a survey of 150 people, it is found that 70 own a car, 90 own a house, and 50 own both.**

    (a) What is a certain event?   1

    (b) What does it mean when events are mutually exclusive?   2

    (c) Are the events of owning a car and owning a house independent?   3

    (d) If a person is selected randomly, and if they do not own a house, what is the probability that they own a car?   4

3. **The probability density function of a continuous random variable is**

$$f(x) = \begin{cases} f(z) = \frac{2}{9}(3z - z^2); 0 \le z \le 3 \\ 0, \hspace{3cm} otherwise \end{cases}$$

    (a) What is the formula of cumulative distribution function for a continuous variable   1

    (b) Compute the definite integral of x^2 from 0 to 3.   2

    (c) Examine whether the probability density function is appropriate.   3

    (d) Find the probability that the value of z is not more than 2.   4

Group - B

4. **A random variable is distributed as below:**

$$P(X) = \frac{3 - |4 - x|}{k}; x = 2, 3, 4, 5, 6$$

    (a) What is the Expectation equivalent to?   1

    (b) Find the value of k.   2

    (c) Determine the value of the expectation.   3

    (d) Find $V(2X - 1)$ 4

5. **The probability density function (pdf) of a continuous random variable is given below:**

$$f(x) = \frac{1}{30}(k + 2x); 2 < x < 5$$

    (a) What is a random variable?   1

    (b) Is probability a discrete variable? Explain in brief.   2

    (c) Find the value of k.   3

    (d) Determine the expectation and variance.   4

6. **The monthly sales (in units) of laptops at a major electronics store are recorded below:**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Sales	120	150	130	170	160	180	200	210

(a) Give an example of a time series data.   1

(b) What are the components of Time Series?   2

(c) Compute the trend using a three-monthly moving average method.   3

(d) Illustrate the trend graphically and estimate the expected laptop sales for September.   4

–AAM–

"Absence of evidence is not evidence of absence. "
– Carl Sagan

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Group - A

1. **A jar contains 5 red marbles and 7 yellow marbles. Three marbles are drawn at random.**

   (a) What is a sample space?   1

   (b) In how many ways can 3 books be chosen from a set of 8 books?   2

   (c) What is the probability that all marbles are yellow?   3

   (d) What is the probability that a marble has a different color?   4

2. **An unbiased coin is tossed 10 times.**

   (a) If a coin is flung 3 times, how many outcomes are generated?   1

   (b) If a coin is flung n times, show how many outcomes are generated.   2

   (c) What is the probability of getting a) at least 3 heads, b) at most 3 heads?   3

   (d) Are these probabilities equal? a) Getting at least 2 heads & b) Getting at least 2 tails. Also justify logically.   4

3. **The probability density function of a continuous random variable is**

$$f(x) = \begin{cases} k(x+1), & 0 \leq x \leq 1 \\ 0, & otherwise \end{cases}$$

   (a) What is a random variable?   1

   (b) Find the value of k   2

   (c) Find the probability that the values of x would lie between 0 and 0.5.   3

   (d) What is the probability that X is greater than 0.8?   4

Group - B

4. **The joint probability function of two random variables X & Y is given below:**

$$P(x,y) = \tfrac{1}{21}(x+y); x = 1,2,3 \ \& \ y = 1,2$$

   (a) What is a probability density function (pdf)?   1

   (b) What is P(X=a) in a pdf, where a is an aribitrary number?   2

   (c) Find the marginal probabilities.   3

   (d) Find $P(x|y), P(x|1)$ and $P(y|4)$ 4

5. **The probability distribution of a random X is provided below:**

X	-1	0	1	2	3
P(x)	$\frac{3}{20}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{20}$

   (a) What is the expectation of a constant m?   1

   (b) Find $E(X)$.   2

   (c) Find $E(Y)$, where $Y = \frac{X}{2}$ 3

   (d) Find Variance of (2X+3).   4

6. **Bangladesh foreign debt has been increasing rapidly in recent years. The Bangladesh bank provides the follwoing data.**

Fiscal Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Debt	41.17	45.81	56.01	62.63	68.55	81.62	95.45	98.94	$\sim$130.00

   (a) Name the components of time series.   1

   (b) What are linear and non-linear trends?   2

   (c) Find 3-yearly moving avergae from the data and plot.   3

   (d) Whaich components of time series may underlie the data? Analyze.   4

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