



BOARD QUESTION PAPER : MARCH 2019

MATHEMATICS AND STATISTICS – I

Notes:

- i. All questions are compulsory.
- ii. Figures to the right indicate full marks.
- iii. Graph paper is compulsory for L.P.P
- iv. Logarithm table will be provided on request.
- v. Answers to the question in Section – I and Section – II should be written in two separate answer books.
- vi. Question from Section – I attempted in the answer book of Section – II and vice-versa will not be assessed / not be given any credit.
- vii. Answer to every question must be written on a new page.

Section – I

Q.1. Attempt any SIX of the following: [12]

- i. Write converse and inverse of the following statement:
“If a man is a bachelor then he is unhappy.” (2)
- ii. Discuss the continuity of f at $x = 1$
Where $f(x) = \frac{3 - \sqrt{2x+7}}{x-1}$ for $x \neq 1$
$$= \frac{-1}{3} \quad \text{for } x = 1$$
 (2)
- iii. Find the value of ‘ k ’ if the function
$$f(x) = \frac{(e^x - 1)\sin x}{x^2}, \text{ for } x \neq 0$$

$$= k, \text{ for } x = 0$$

is continuous at $x = 0$. (2)
- iv. Find the marginal revenue if the average revenue is 45 and elasticity of demand is 5. (2)
- v. Find $\frac{dy}{dx}$ if $x^3 + y^2 + xy = 7$ (2)
- vi. Find the area bounded by the curve $y = x^4$, X-axis and lines $x = 1$ and $x = 5$. (2)
- vii. Evaluate: $\int_{-2}^3 \frac{dx}{x+5}$ (2)
- viii. Evaluate: $\int \frac{dx}{16-9x^2}$ (2)

Q.2. (A) Attempt any TWO of the following: (6)[14]

- i. Prove that the following statement pattern is a tautology:
 $(q \rightarrow p) \vee (p \rightarrow q)$ (3)
- ii. Find $\frac{dy}{dx}$ if $y = x^x + 5^x$ (3)
- iii. Evaluate: $\int x \cos^{-1} x \, dx$ (3)



(B) Attempt any TWO of the following: (8)

i. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 5 \\ 2 & 4 & 7 \end{bmatrix}$ by using adjoint method. (4)

ii. If f is continuous at $x = 0$ then find $f(0)$ where $f(x) = \frac{5^x + 5^{-x} - 2}{x^2}$, $x \neq 0$ (4)

iii. A manufacturer can sell x items ($x > 0$) at a price of ₹ $(280 - x)$ each. The cost of producing x items is ₹ $(x^2 + 40x + 35)$. Find the number of items to be sold so that the manufacturer can make maximum profit. (4)

Q.3. (A) Attempt any TWO of the following: (6)[14]

i. If p and q are true statements and r and s are false statements, find the truth value of the following:

$(p \wedge \sim r) \wedge (\sim q \wedge s)$ (3)

ii. Differentiate e^{4x+5} w.r.t. e^{3x} (3)

iii. Evaluate: $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$ (3)

(B) Attempt any TWO of the following: (8)

i. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix}$, find $(AB)^{-1}$ (4)

ii. For manufacturing x units, labour cost is $150 - 4x$ and processing cost is x^2 . Price of each unit is $p = 10,800 - 4x^2$. Find the values of x for which:

(a) Total cost is decreasing.

(b) Revenue is increasing (4)

iii. Evaluate : $\int_3^9 \frac{\sqrt[3]{12-x}}{\sqrt[3]{x} + \sqrt[3]{12-x}} dx$ (4)