

BOARD QUESTION PAPER: MARCH 2018

Notes:

- i. All questions are compulsory.
- ii. Figures to the right indicate full marks.
- iii. Graph paper is necessary for L.P.P
- iv. Use of logarithmic table is allowed.
- 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. Draw Venn diagram for the truth of the following statements:

(2)

- a. All rational numbers are real numbers.
- b. Some rectangles are squares.
- ii. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ using elementry transformations. (2)
- iii. Examine the continuity of

$$f(x) = x^2 - x + 9 \quad \text{for } x \le 3$$

$$= 4x + 3$$
 for $x > 3$, at $x = 3$ (2)

iv. Find
$$\frac{dy}{dx}$$
, if $y = \cos^{-1}(\sin 5x)$ (2)

- v. The price P for demand D is given as $P = 183 + 120D 3D^2$. Find D for which the price is increasing. (2)
- vi. Evaluate: $\int \frac{1}{x(3 + \log x)} dx$ (2)
- vii. Find cofactors of the elements of the matrix $A = \begin{bmatrix} -1 & 2 \\ -3 & 4 \end{bmatrix}$ (2)
- viii. Evaluate: $\int \frac{1}{9x^2 + 49} dx$ (2)

Q.2. (A) Attempt any TWO of the following:

(6)[14]

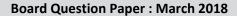
i. Find k, if
$$f(x) = \frac{\log(1+3x)}{5x}$$
 for $x \neq 0$
= k for $x = 0$

is continuous at x = 0. (3)

ii. Examine whether the following statement pattern is tautology, contradiction or contingency:

$$p \lor \sim (p \land q) \tag{3}$$

iii. If $x = \cos^2 \theta$ and $y = \cot \theta$ then find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$. (3)



(4)

(8)

(6)[14]



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

- **(8)** The sum of three numbers is 6. If we multiply the third number by 3 and add it to the second i. number we get 11. By adding first and third numbers we get a number, which is double than the second number. Use this information and find a system of linear equations. Find these three numbers using matrices. **(4)**
- Find the area of the region bounded by the parabola $y^2 = 16x$ and the line x = 4. **(4)** ii.
- The consumption expenditure E_c of a person with the income x, is given by iii. $E_c = 0.0006x^2 + 0.003x$. Find MPC, MPS, APC and APS when the income x = 200.

Attempt any TWO of the following: Q.3. (A)

Discuss continuity of f (x) = $\frac{x^3 - 64}{\sqrt{x^2 + 9} - 5}$ for $x \neq 4$ i. = 10(3)

ii. Find
$$\frac{dy}{dx}$$
, if $e^x + e^y = e^{x-y}$ (3)

iii. Using truth table show that $\sim (p \rightarrow \sim q) \equiv p \wedge q$ (3)

(B) Attempt any TWO of the following:

Evalute: $\int \frac{\sin x}{\sqrt{\cos^2 x - 2\cos x - 3}} dx$ i. (4)

The total cost function of a firm is $C = x^2 + 75x + 1600$ for output x. Find the output (x) for ii. which average cost is minimum. Is $C_A = C_M$ at this outpout? (4)

iii. Evaluate:
$$\int_{1}^{2} \frac{1}{(x+1)(x+3)} dx$$
 (4)