



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 elementary transformations. (2)
- iii. Examine the continuity of $f(x) = x^2 - x + 9$ for $x \leq 3$
 $= 4x + 3$ 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:
 $p \vee \sim (p \wedge q)$ (3)
- iii. If $x = \cos^2 \theta$ and $y = \cot \theta$ then find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$. (3)

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

- i. The sum of three numbers is 6. If we multiply the third number by 3 and add it to the second 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)
- ii. Find the area of the region bounded by the parabola $y^2 = 16x$ and the line $x = 4$. (4)
- iii. The consumption expenditure E_c of a person with the income x , is given by $E_c = 0.0006x^2 + 0.003x$. Find MPC, MPS, APC and APS when the income $x = 200$. (4)

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

- i. Discuss continuity of $f(x) = \frac{x^3 - 64}{\sqrt{x^2 + 9} - 5}$ for $x \neq 4$
 $= 10$ for $x = 4$; at $x = 4$ (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:**(8)**

- i. Evaluate: $\int \frac{\sin x}{\sqrt{\cos^2 x - 2\cos x - 3}} dx$ (4)
- ii. The total cost function of a firm is $C = x^2 + 75x + 1600$ for output x . Find the output (x) for which average cost is minimum. Is $C_A = C_M$ at this output? (4)
- iii. Evaluate : $\int_1^2 \frac{1}{(x+1)(x+3)} dx$ (4)