

# BOARD QUESTION PAPER : JULY 2017

## Notes:

- i. All questions are compulsory.
- ii. Figures to the right indicate full marks.
- iii. Answer to every question must be written on a new page.
- iv. L.P.P. problem should be solved on graph paper.
- v. Log table will be provided on request.
- vi. Write answers of Section – I and Section – II in one answer book.

## Section – I

### Q.1. Attempt any SIX of the following:

[12]

- i. Write the negation of the following statements: (2)
  - a. Radha likes tea or coffee.
  - b.  $\exists x \in \mathbb{R}$  such that  $x + 3 \geq 10$ .
- ii. If  $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ , find  $A^2 - 3A$ . (2)
- iii. Discuss the continuity of the function  $f$  at  $x = 0$   
If  $f(x) = \frac{2^{3x} - 1}{\tan x}$ , for  $x \neq 0$   
 $= 1$ , for  $x = 0$  (2)
- iv. Evaluate :  $\int \frac{x+1}{x(x+\log x)} dx$  (2)
- v. Solve the equations  $x + y = 4$  and  $2x - y = 5$  using the method of reduction. (2)
- vi. If the function  $f$  is continuous at  $x = 2$ , then find  $f(2)$   
where  $f(x) = \frac{x^5 - 32}{x - 2}$ , for  $x \neq 2$ . (2)
- vii. Find the elasticity of demand, if the marginal revenue is 50 and price is ₹ 75. (2)
- viii. Differentiate  $\log(1 + x^2)$  w. r. t.  $\tan^{-1}(x)$  (2)

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

[6][14]

- i. If  $p$  : It is raining.  
 $Q$  : It is humid.  
Write the following statements in symbolic form:
  - a. It is raining or humid.
  - b. If it is raining then it is humid.
  - c. It is raining but not humid. (3)
- ii. Using truth table, examine whether the following statement pattern is tautology, contradiction or contingency:  
 $p \vee [\sim(p \wedge q)]$  (3)
- iii. Evaluate :  $\int \frac{x^2}{x^6 - 4x^3 + 13} dx$  (3)

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

i. If the function  $f$  is continuous at  $x = 0$  where  $f(x) = 2\sqrt{x^3 + 1} + a$ , for  $x < 0$   
 $= x^3 + a + b$ , for  $x \geq 0$   
and  $f(1) = 2$ , then find  $a$  and  $b$ . (4)

ii. For manufacturing  $x$  units, labour cost is  $150 - 54x$ , processing cost is  $x^2$  and Revenue  $R = 10800x - 4x^3$ .  
Find the values of  $x$  for which  
a. Total cost is decreasing.  
b. Revenue is increasing. (4)

iii. The total cost  $C$  for producing  $x$  units is  $(x^2 + 60x + 50)$  and the price is  $(180 - x)$  per unit. For how many units the profit is maximum? (4)

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

i. If  $y = \sin^{-1} \frac{8x}{\sqrt{1+16x^2}}$ , find  $\frac{dy}{dx}$ . (3)

ii. If  $y = 5^x + x^x$ , find  $\frac{dy}{dx}$ . (3)

iii. Evaluate :  $\int \frac{2x + 1}{(x + 1)(x - 2)} dx$  (3)

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

i. Find the inverse of matrix  $A$  by using adjoint method;  
where  $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$  (4)

ii. Find the area of the region bounded by the curve (parabola)  $y^2 = 4x$  and the line  $x = 3$ . (4)

iii. Evaluate :  $\int_0^1 \frac{x(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$  (4)