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. $\exists\, x \in R$ 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 $=10800\,x - 4x^3$.

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 ` $(x^2 + 60\,x + 50)$ 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 $y = \sin^{-1}\left(\frac{8x}{1 + 16x^2}\right)$, find $\frac{dy}{dx}$ (3)

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