BOARD QUESTION PAPER : OCTOBER 2015

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. Answers to the questions in Section – I and Section – II should be written in two separate answer books.

Section – I

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

i. Find x and y if $x + y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$, $x - y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$ (2)

ii. Find $\frac{dy}{dx}$ if $y = \sin^{-1}\left(\sqrt{1-x^2}\right)$ (2)

iii. Use the quantifiers to convert each of the following open sentences defined on N into true statement:
a. $5x - 3 < 10$ b. $x^2 \geq 1$ (2)

iv. Examine the continuity of the following function:

$$\left.\begin{aligned} f(x) &= \frac{x^2-16}{x-4}, && \text{for } x \neq 4 \\ &= 8, && \text{for } x = 4 \end{aligned}\right\} \text{ at } x = 4$$ (2)

v. Find the adjoint of the matrix $A = \begin{bmatrix} 2 & -3 \\ 3 & 5 \end{bmatrix}$ (2)

vi. Find the elasticity of demand if the marginal revenue is ₹ 50 and price is ₹ 75. (2)

vii. Evaluate: $\int \frac{\tan\sqrt{x}}{\sqrt{x}} dx$ (2)

viii. Evaluate: $\int \frac{1}{x^2 + 8x + 20} dx$ (2)

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

i. Write converse, inverse and contrapositive of the statement.
"If two triangles are not congruent then their areas are not equal." (3)

ii. Examine the continuity of the following function:

$$\left.\begin{aligned} f(x) &= x^2 \cos\left(\frac{1}{x}\right), && \text{for } x \neq 0 \\ &= 0, && \text{for } x = 0 \end{aligned}\right\} \text{ at } x = 0$$ (3)

iii. Find $\frac{dy}{dx}$ if $y = x^x + 5^x$ (3)

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

i. Solve the following equations by reduction method:

$x + 2y + z = 8$

$2x + 3y - z = 11$

$3x - y - 2z = 5$ (4)

ii. Find the volume of the solid obtained by revolving about the X-axis, the region bounded by the curve $\frac{x^2}{4} - \frac{y^2}{9} = 1$ and the lines $x = 2, x = 4$ (4)

iii. If the demand function is $D = 50 - 3p - p^2$, find the elasticity of demand at

a. $p = 5$, b. $p = 2$, Interpret your result. (4)

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

i. By constructing the truth table, determine whether the following statement pattern is a tautology, contradiction or contingency.

$(p \to q) \wedge (p \wedge \sim q)$ (3)

ii. If $f(x) = \frac{1 - \sin x}{(\pi - 2x)^2}$, for $x \neq \frac{\pi}{2}$ is continuous at $x = \frac{\pi}{2}$, then find $f\left(\frac{\pi}{2}\right)$. (3)

iii. If $x^{5/3} y^{2/3} = (x + y)^{7/3}$, then show that $\frac{dy}{dx} = \frac{y}{x}$. (3)

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

i. Cost of assembling x wall clocks is $\left(\frac{x^3}{3} - 40x^2\right)$ and labour charges are $500x$.

Find the number of wall clocks to be manufactured for which average cost and marginal cost attain their respective minimum. (4)

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

iii. Evaluate: $\int \log(1 + x^2) dx$ (4)