# PAPER – I : MODEL PAPER – 03

**(**BASED ON MARCH 2015**)**

**MATHEMATICS & STATISTICS**

**COMMERCE**

**TIME : 1 HR 30 MIN** **MARKS : 40**

**NOTES :** 1. All questions are compulsory

2. Answers to section I and section II must be written in separate ans. Books

3. Graph paper is compulsory for L.P.P.

4. Logarithm table will be provided on demand

5. Figures to the right indicate full marks

6. Answers to every question must be written on new page

ALL THE BEST

**Q1. (A) Attempt any six of the following** **(12)**

**01.** Express the following statement in symbolic form and write its truth value

"3 < 5 if and only if 3i is a real number"

**02.** $A = \begin{pmatrix} 3 & -1 \\ 2 & 4 \end{pmatrix}$ ; $B = \begin{pmatrix} 1 & 2 \\ -3 & 0 \end{pmatrix}$ Find the matrix X such that $2X + 3A - 4B = 0$

**03.** Find the value of k if the function

$f(x) = \dfrac{\sin 9x}{4x}$ ; $x \neq 0$

$= k$ ; $x = 0$ is continuous at $x = 0$

**04.** Find $dy/dx$ if $y = \sin^{-1}(x^2)$

**05.** The total cost for production of Q items is given $C = Q^3 - 600Q^2 + 1200Q$ . Find the values of Q for which average cost is decreasing

**06.** Evaluate : $\int \dfrac{1}{x(3 + \log x)}\, dx$

**07.** $A = \begin{pmatrix} 4 & -3 \\ 2 & 1 \end{pmatrix}$

Show that : $A^2 - 5A + 10I = 0$

**08.** Evaluate : $\int x.\log x\, dx$

**Q2. (A) Attempt any TWO of the following** **(06)**

**01.** Prove : $\sim (p \leftrightarrow q) \equiv (\sim p \wedge q) \vee (p \wedge \sim q)$

**02.** Examine the continuity of the following function

$$f(x) = 5x - 3 \quad ; \quad 0 \leq x < 1$$
$$= x^2 + 1 \quad ; \quad 1 \leq x \leq 2 \qquad \text{at } x = 1$$

**03.** Find $\frac{dy}{dx}$ if $y = \cot^{-1}\left[\frac{1 + 12x^2}{x}\right]$

**(B) Attempt any TWO of the following** **(08)**

**01.** $A = \begin{pmatrix} 1 & 2 & -2 \\ 0 & -2 & 1 \\ -1 & 3 & 1 \end{pmatrix}$ Find $A^{-1}$ by using elementary transformation

**02.** Find the area of the region bounded by parabola $y^2 = 4x$ and the line $x = 3$

**03.** Demand function x , for a certain commodity is given as $x = 200 - 4p$ , where p is the price . Find

i) elasticity of demand as function of p

ii) elasticity of demand when $p = 10$ ; $p = 30$ . Interpret the results

iii) the price p for which elasticity of demand is equal to one

**Q3. (A) Attempt any TWO of the following** **(06)**

**01.** Express the truth of each of the following statements by Venn Diagram

a) Some graduates are not government servants

b) No wicket keeper is a bowler

c) an equilateral triangle is an isosceles triangle

**02.** if f is continuous at $x = 0$ , then find $f(0)$

$$f(x) = \frac{10^x - 5^x - 2^x + 1}{\tan^2 x} \quad ; \quad x \neq 0$$

**03.** find $dy/dx$ if $x = e^{4t + 5}$ ; $y = e^{3t}$

**(B) Attempt any TWO of the following** **(08)**

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

**02.** $$\int_{3}^{9} \frac{\sqrt[3]{12-x}}{\sqrt[3]{x} + \sqrt[3]{12-x}}\, dx$$

**03.** A firm wants to maximize its profit . The total cost function is C = 370Q + 550 and revenue R = 730Q – $3Q^2$ . Find the output for which profit is maximum and also find the profit amount at this output .

---

DO NOT STOP

GET READY FOR NEXT