

2018

Time : 2 hours

Full Marks : 50

Answer any five from Q.No. 1 and any
three from Q.No. 2

*The figures in the right-hand margin indicate marks
Candidates are required to answer in their own words
as far as practicable*

(ELEMENTARY MATHEMATICS)

1. Answer any five : 4 × 5

(a) Find the ratio in which the joint of $P(4, 4)$
and $Q(8, 10)$ is divided by the point $R(6, 7)$.

(b) Find the equation of a line passing through
two point $(5, 0)$ and $(-1, 1)$.

(c) Prove that

$$\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (y-z)(z-x)(x-y)(x+y+z)$$

(2)

(d) Verify that $(A^T)^{-1} = (A^{-1})^T$

where $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(e) Show that

$$\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{\sqrt{x}} = 0.$$

(f) Examine the continuity of the function

$$f(x) = \begin{cases} \frac{\sin x}{x}, & \text{when } x \neq 0 \\ 1, & \text{when } x = 0 \end{cases}$$

(g) Find the derivative of $y = \sqrt{(\sin \sqrt{x})}$.

(h) Evaluate

$$\int \frac{dx}{\sin(x-a)\sin(x-b)}$$

(3)

2. Answer any *three* questions :

10 × 3

(a) Evaluate

$$\int_0^1 x^2 e^{2x} dx$$

(b) Find the maximum and minimum values of the polynomial function f is given by

$$f(x) = 8x^5 - 15x^4 + 10x^2$$

(c) Prove that

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + 1 \right)$$

(d) Integrate

$$I = \int e^{ax} \text{ as } (bx+c) dx.$$

(e) Find the derivative of

$$y = \sin a^{x(1+\sqrt{\cos^2 x})}$$