

# B.Sc. B.Ed SEM-I Examination: 2019

Course-GE 01/02

Subject: Mathematics

Time: 2 Hours

F.M. 50

Answer any *ten* questions

(5 × 10 = 50)

1. Find  $\arg Z$  where  $Z = 1 + i \tan \frac{3\pi}{5}$
2. If  $\alpha, \beta, \gamma$  be the roots of the equation  $x^2 + px^2 + qx + r = 0$  ( $r \neq 0$ ), find the equation whose roots are  $\frac{1}{\alpha} + \frac{1}{\beta} - \frac{1}{\gamma}, \frac{1}{\beta} + \frac{1}{\gamma} - \frac{1}{\alpha}, \frac{1}{\alpha} + \frac{1}{\gamma} - \frac{1}{\beta}$
3. If  $p, q, r, s$  be all real numbers greater than 1, prove that  $(p+1)(q+1)(r+1)(s+1) < 8(pqrs + 1)$ .
4. Solve by matrix method, the system of equation

$$x + z = 0$$

$$3x + 4y + 5z = 2$$

$$2x + 3y + 4z = 1$$

5. Find the matrix A if  $A^{-1} = \begin{pmatrix} 3 & -1 & 1 \\ 1 & -2 & 3 \\ 3 & -3 & 4 \end{pmatrix}$

6. If  $f(x) = 1 + x$  for  $x < 0$

$$= 1 \text{ for } 0 \leq x \leq 1$$

$$= 2x^2 + 4x + 5 \text{ for } x > 1$$

Find  $f'(x)$  for all values of  $x$  for which it exist. Does  $\lim_{x \rightarrow 0} f'(x)$  exist?

7. Use Leibnitz's formula to find the  $n^{\text{th}}$  derivatives of  $e^{ax} \cos bx$
8. Use L Hospital's rule to prove the following limit.

$$\lim_{x \rightarrow 0} \frac{(1+x)^{\frac{1}{x}} - e}{x}$$

9. Find the reduction formula for  $\int \sec^m x dx$ ,  $m$  being a positive integer greater than 1.
10. Apply elementary row operations to reduce the following matrix to a row echelon matrix.

$$\begin{pmatrix} 2 & 0 & 4 & 2 \\ 3 & 2 & 6 & 5 \\ 5 & 2 & 10 & 7 \\ 0 & 3 & 2 & 5 \end{pmatrix}$$

11. Find the volume and area of the curved surface of a paraboloid of revolution formed by revolving the parabola  $y^2 = 4ax$  about the  $x$ -axis and boundary by the section  $x = x_1$ .
12. Show that

$$\int_0^1 \sqrt{1-x^4} dx = \frac{\left\{ \Gamma\left(\frac{1}{4}\right) \right\}^2}{6\sqrt{2\pi}}$$