

B.Sc. B.Ed SEM-I Examination: 2020

Course-GE-1.1

Subject: Mathematics (Elementary Algebra and Calculus)

Time: 2 Hours

F.M. 50

Answer any *ten* questions

(5 × 10 = 50)

1. If n be a positive integer, then prove that

$$\left(\frac{1 + \sin \theta + i \cos \theta}{1 + \sin \theta - i \cos \theta} \right)^n = \cos \left(\frac{n\pi}{2} - n\theta \right) + i \sin \left(\frac{n\pi}{2} - n\theta \right).$$

2. If α, β, γ be the roots of $x^3 + qx + r = 0$, then find $\Sigma \frac{\alpha^2}{\beta\gamma}$.

3. If a, b, c be positive, then prove that, $\frac{2}{b+c} + \frac{2}{c+a} + \frac{2}{a+b} > \frac{9}{a+b+c}$ unless $a = b = c$.

4. Show that $\Delta^2 \{(x+1)(x+2)(x+3)\} = 6(x+3)$.

5. Show that, $\lim_{x \rightarrow 0} [x]$ does not exist.

6. Let $D \subseteq \mathbb{R}$ and $f: D \rightarrow \mathbb{R}$ be continuous on D . Then show that $|f|$ is continuous on D .

7. Evaluate.

$$\lim_{x \rightarrow 0} \frac{e^x - e^{\sin x}}{x - \sin x} \text{ by using L' Hospital's rule.}$$

8. Find the n^{th} derivative of $\cos x$.

9. Prove that, every differentiable function is continuous but the converse is not true.

10. Find the reduction formula for $\int \sin^n x dx$.

11. Solve the equations by using matrix.

$$x + y + z = 4$$

$$x - y + z = 0$$

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

12. Define skew-symmetric matrix with example.