Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 18

B.Tech(IT/CSE) (Sem.–4)

MATHEMATICS-III/ENGG. MATHEMATICS-III

Subject Code : CS-204

M.Code : 56514

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Write briefly :

1) Check the convergence of the sequence

$$a_n = \left(\frac{2n+1}{2n-1}\right)^n$$

2) Define Roll's theorem.

3) Write down the formula for finding centre of gravity of a uniform plane Lamina.

4) Show that $\sin z$ is analytic function.

5) State Cauchy's integral formula.

6) Define conformal mapping.

7) Evaluate $\int_C \frac{z+1}{z^2-3z+2}$, $C : |z| = 1$

8) Write down the Euler's formula for finding solution of an initial value problem.

9) Write down the wave equation for transverse vibrations in one dimensional string.

10) Classify the partial differential equation as elliptic, parabolic or hyperbolic :

$$\frac{\partial^2 z}{\partial x^2} - 5\frac{\partial^2 z}{\partial y^2} = 0$$

SECTION-B

11) Evaluate $\iint_R ydxdy$, where R is the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$

12) Determine the analytic function whose real part is $\log \sqrt{(x^2 + y^2)}$.

13) Expand $f(z) = \frac{1}{(z-1)(z-3)}$ in Laurent's series, valid for $|z| > 3$.

14) Show that the transformation $w = \frac{z-i}{z+i}$ maps the real axis in the z-plane onto the circle $|w| = 1$.

15) Find the general solution of Laplace equation by variable separable method.

SECTION-C

16) Evaluate $\int_0^{2\pi} \frac{d\theta}{1 - 2a\cos\theta + a^2}$, $0 < a < 1$ using Contour integration.

17) A homogeneous conducting rod of length 100 cm has its ends kept at zero temperature and temperature initially is

$$u(x, 0) = \begin{cases} x, & 0 \le x \le 50 \\ 100 - x, & 50 \le x \le 100 \end{cases}$$

Find the temperature $u(x, t)$ at any time t.

18) Apply Runge-Kutta method of order 4 to find $y(0.1)$ for the initial value problem

$$\frac{dy}{dx} = xy + y^2, y(0) = 1.$$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.