

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

$$a_n = \frac{2n-1}{2n+1}$$

- 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 $\iint_R y dx dy$, 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 $\int_0^{2\pi} \frac{d^{-a}}{1 - 2a \cos \theta - \theta^2}$, $0 < a < 1$ using Contour integration.
- 17) A homogeneous conducting rod of length 100 cm has its ends kept at zero temperature and temperature initially is

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

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.