

Roll No.

Total No. of Pages : 02

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B.Tech. (CSE/AE/ME) (Sem.-2)

MATHEMATICS-II

Subject Code : BTAM-203-18

M.Code. : 76256

Date of Examination : 18-07-22

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 & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

Answer briefly :

1. a) Solve $y = px + \sin^{-1}p$.
- b) Find Integrating Factor of $(1 + xy) y dx + (1 - xy) x dy = 0$.
- c) Find non-ordinary (singular) points of $\frac{d^2y}{dx^2} + (x-1) \frac{dy}{dx} + y = 0$.
- d) Solve the initial value problem $e^x (\cos y dx - \sin y dy) = 0 ; y(0) = 0$.
- e) Solve $\frac{dy}{dx} + y = 1$
- f) Write C-R equations in cartesian co-ordinates.
- g) Show that the function $u = \sin x \cosh y + 2 \cos x \sinh y + x^2 - y^2 + 4xy$ is harmonic.
- h) Find the image of the circle $|z| = 1$ under the transformation $w = z + 2 + 4i$.
- i) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1) dz$ along the straight line joining $(1 - i)$ to $(2 + i)$.
- j) State Cauchy's residue theorem.

SECTION-B

2. a) Solve $\frac{dy}{dx} = \frac{x-2y+5}{2x+y-1}$.
- b) Solve the differential equation $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3 \log x$.
3. a) Solve the differential equations $x + \frac{p}{\sqrt{1+p^2}} = a$.
- b) Solve the differential equations $\frac{d^2y}{dx^2} + y = \sec x$.
4. a) Solve $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}} \right) \frac{dx}{dy} = 1, x \neq 0$.
- b) Solve : $2 \frac{dy}{dx} = \frac{y}{x} + \frac{y^2}{x^2}$.
5. Solve $(1+x^2)y'' + xy' - y = 0$ in series about $x = 0$.

SECTION-C

6. a) Find p such that the function $f(z) = r^2 \cos 2\theta + ir^2 \sin p\theta$ is analytic.
- b) Evaluate $\int_C e^{\sin z^2} dz$ where C is $|z| = 1$.
7. a) Prove that $\log \sqrt{x^2 + y^2}$ is harmonic.
- b) Expand $f(z) = \frac{1}{z^2 - 4z + 3}$ as a Taylor's series about $z = 4$.
8. a) Find the analytic function $f(z) = u + iv$ given that $2u + 3v = e^x (\cos y - \sin y)$.
- b) Evaluate $\int_C \frac{\cos \pi z}{z^2 - 1} dz$, where C is the rectangle whose vertices are $2 \pm i, -2 \pm i$.
9. Find the Laurent's series expansion of $f(z) = \frac{1}{z(z-1)}$ for $0 < |z| < 1$ and $0 < |z-1| < 1$.

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.