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

Total No. of Questions: 09

B.Tech All (Sem. – 2)

MATHEMATICS-II

Subject Code: BTAM- 203-18

M Code: 76256

Date of Examination : 23-01-23

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, carrying EIGHT marks each.**
3. **Attempt any FIVE questions from SECTION B & C, selecting atleast TWO questions from each of these SECTIONS B & C.**

SECTION-A

1. Answer the following:

   a) Solve y+$px = x^4p^2$

   b) Solve $(y - px)(p - 1) = p$

   c) Find the particular integral of$\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$

   d) Solve $\frac{d^2x}{dt^2} + 5\frac{dx}{dt} + 6x = 0$ given $x(0) = 0, \frac{dx}{dt}(0) = 15.$

   e) Solve $\frac{dy}{dx} + 2xy = x.$

   f) Define harmonic function.

   g) Find the residue at $z = 0$ of $z\cos\frac{1}{z}.$

   h) State Liouville's theorem.

   i) Find all the values of z such that $e^z = -2.$

   j) Show that e^z is nowhere analytic.

SECTION-B

2. a) Solve $xy(1 + xy^2)\frac{dy}{dx} = 1$

   b) Solve $e^{4x}(p - 1) + e^{2y}p^2 = 0$

3. Solve $x(1-x^2)\frac{dy}{dx}+(2x^2-1)y=x^3$

4. a) Using method of variation of parameters, solve $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+y=e^x\log x$.

   b) Solve $y''+6y'+13y=0, y(0)=3, y'(0)=-1$.

5. Solve $x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+y=\frac{1}{(1-x)^2}$

SECTION-C

6. a) Evaluate $\oint_C \frac{e^z}{(z^2+\pi^2)^2}dz$ where C is $|z|=4$.

   b) Find Laurent's expansion of $f(z)=\frac{7z-2}{(z+1)z(z-2)}$ in region $1<z+1<3$.

7. If $\frac{(1+i)^{x+iy}}{(1-i)^{x-iy}}=\alpha+i\beta$, prove that one of the values of $\tan^{-1}\frac{\beta}{\alpha}=\frac{1}{2}\pi x+y\log 2$.

8. Find the residue of $f(z)=\frac{z^3}{(z-1)^4(z-2)(z-3)}$ as its poles and evaluate $\oint_C f(z)dz$, where C is the circle $|z|=2.5$.

9. Find the analytic function whose real part is $e^{2x}(x\cos 2y-y\sin 2y)$.

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