

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Mechanical Engg) (2018 & onwards) (Sem.-2)

MATHEMATICS-II

Subject Code : BTAM-203-18

M.Code : 76256

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. Solve $y(\log y) dx + (x - \log y) dy = 0$.
2. Solve $p = \log(px - y)$.
3. Find the particular integral of $(D^2 - 2D + 4)y = e^x \cos x$.
4. Solve $(D^2 + 1)^3 = 0$.
5. What is the necessary and sufficient condition for a differential equation to be exact?
6. Define analytic function.
7. Evaluate $\oint_C (x^2 - y^2 + 2ixy) dz$ where C is the contour $|z| = 1$.
8. State maximum modulus theorem.
9. Find all zeros of $\sin z$.
10. What is the principal value of i^i ?

SECTION-B

11. Solve :

a) $x \frac{dy}{dx} + y = x^3 y^6$.

b) Solve $(xy^3 + y) dx + 2(x^2y^2 + x + y^4) dy = 0$.

12. Solve $y = 2px + y^2 p^3$

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

b) Solve $y'' - 2y' + 5y = 0$ if $y(0) = -3, y'(0) = 1$.

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

SECTION-C

15. Show that the function $u = e^{-2y} \sin(x^2 - y^2)$ is harmonic. Find conjugate function v and express $u + iv$ as an analytic function of z .

16. Derive Cauchy Riemann equations for analytic functions.

17. a) Evaluate $\int_{1-i}^{2+3i} (z^2 + z) dz$ along the line joining the points $(1, -1)$ and $(2, 3)$.

b) By integrating around a unit circle evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5 - 4\cos \theta} d\theta$.

18. Evaluate $\frac{1}{z^2 - 3z + 2}$ in the region.

a) $|z| < 1$

b) $1 < |z| < 2$

c) $|z| > 2$

d) $0 < |z - 1| < 1$

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.