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

Total No. of Questions : 09

B.Tech. (ME) (Sem.–4)

MATHEMATICS-III

Subject Code : AM-201

M.Code : 54035

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

1. Write briefly :

a) Give Dirichlet's conditions for the Fourier series expansion of $f(x)$.

b) Find the value of a_n in the Fourier series expansion of $f(x) = x, -\pi \le x \le \pi$.

c) Find Laplace transform of $f(t) = t^n$.

d) Write the definition of unit step function.

e) Write the Laplace tansform of periodic function $f(t)$ with period T.

f) Find the complementary function of PDE : $(2D^2 + 5DD' + 2D'^2)\, z = 0$.

g) Form the partial differential equation from $z = ax + a^2 y^2 + b$.

h) Give definition of singular point.

i) Give definition of conformal mapping.

j) Evaluate $\int[(x^2 + 2y)\, dx + (3x - y)dy]$ along the curve $x = 2t$, $y = t^3 + 3$ between (0, 3), (2, 4).

SECTION-B

2. Find the Fourier series expansion of $f(x)=\begin{cases}-1, & 0<x<\pi \\ 2, & \pi<x<2\pi\end{cases}$.

3. i) Find L $\{t \sin at\}$ ii) $L^{-1}\left[\frac{s^2-3s+4}{s^3}\right]$.

4. Prove the recurrence relation $\frac{d}{dx}[x^n J_n(x)]=x^n J_{n-1}(x)$ for Bessel function.

5. Solve the linear partial differential equation $(mz - ny)\,p + (nx - lz)q = ly - mx$.

6. Check if the function $f(z) = 2xy + i\,(x^2 - y^2)$ is analytic ?

SECTION-C

7. a) Find the half range Fourier cosine series expansion of $f(x) = x$, $0 < x < \pi$.

   b) Find $L^{-1}\left\{\frac{1}{(s+2)(s-1)}\right\}$ using convolution theorem.

8. a) Solve the differential equation $\frac{dy}{dt}+2y=e^{-3t}, y(0)=1$ using Laplace transform.

   b) Solve $(D^2 + 4DD' - 5D'^2)\,z = \sin(2x + 3y)$.

9. a) Find the analytic function, whose real part is $u=\frac{\sin 2x}{\cosh 2y-\cos 2x}$.

   b) Find the Taylor's series expansion of $f(z)=\frac{1}{(z+1)(z+3)}$ for the region $|z| < 1$.

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.