SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL NO : | | | | | | | | | | | | Total number of pages:| |

Total number of questions:09

B.Tech. -ME/ 3rd Sem

Engg Mathematics III

(RP)

Subject Code :AM-201

Batch: 2004 onwards

M/18

Time allowed: 3 Hrs Max Marks:60

Important Instructions:

- Section A is compulsory
- Attempt any four questions from section B
- Attempt any two questions from section C
- Assume any missing data
- Additional instructions, if any

PART A (2×10)

Q. 1. Answer in brief:

(a) Find the fourier expansion in (0 ,2) of the function f(x) = $4 - x^2$

(b) Write the Euler's formulae for fourier series.

(c) Find $L^{-1}\left(\frac{s+2}{s^2-4s+13}\right)$

(d) Given $L\left(2\sqrt{\frac{t}{\pi}}\right) = \frac{1}{s^{\frac{3}{2}}}$. Show that $L\left(\frac{1}{\sqrt{\pi t}}\right) = \frac{1}{\sqrt{s}}$

(e) State Rodrigue's formula.

(f) Show $\left[J_{\frac{1}{2}}(x)\right]^2 + \left[J_{-\frac{1}{2}}(x)\right]^2 = \frac{2}{\pi x}$

(g) Find p.d.e by eliminating a & b from z = ax + (1-a) y + b

(h) Find the PI of 4r – 4s + t = 16 log (x + 2y)

(i) Evaluate $\oint_C \frac{\sin 3z}{z+\frac{\pi}{2}}\,dz$ where c is a circle |z| = 5

(j) Find the analytic function whose real part is $\log\sqrt{x^2+y^2}$

PART B (5×4)

Q. 2. Find the fourier series of the following function $f(x) = \begin{cases} x^2 & for \ \ 0 \le x \le \pi \\ -x^2 & for \ \ -\pi \le x \le 0 \end{cases}$

Q. 3. Find the inverse laplace transform of $\log\left(1 + \frac{1}{s^2}\right)$

Q. 4. Solve in series the equation $(2x + x^3)\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6xy = 0$

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

Q. 6. Evaluate $\int_0^{2+i} \bar{z}^2 \, dz$ along (I) the line $y = \frac{x}{2}$ (II) the real axis to 2 and then vertically to 2+i

PART C (10×2)

Q. 7. Use method to contour integration to evaluate $\int_{-\infty}^{\infty} \frac{dx}{x^4+1}$

Q. 8. A string of length l is initially at rest in equilibrium position and each of its point is given the velocity $\frac{\partial y}{\partial t}_{t=0} = b \sin^3 \frac{\pi x}{l}$ Find the displacement y (x , t)

Q. 9. (I) Solve the equation $\frac{d^2y}{dt^2} + \frac{dy}{dt} - 2y = \sin t$ with the initial conditions y(0) = 0 and y'(0) = 0

(II) Show $4J_n'' = J_{n-2} - 2J_n + J_{n+2}$