64+2 =66.

SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, *FEROZEPUR*

ROLL No: | | | | | | | | | | | | |

Total number of pages:[ ]

Total number of questions:06

B.Tech. || EE & CIVIL / ECE || 3rd Sem

Engg Mathematics III

Subject Code:BTAM-301/301A (RP)

Paper ID: M|18

Time allowed: 3 Hrs (2011 - ~~2014~~) onwards **Max Marks: 60**

Important Instructions:

- **All questions are compulsory**
- **Assume any missing data**
- **Additional instructions, if any**

PART A (2×10)

Q. 1. Short-Answer Questions: All COs

(a) State Euler's formula for a_o, a_n & b_n

(b) Express $4x^3 - 2x^2 - 3x + 8$ in terms of legendre polynomial

(c) Solve the P.D.E

(d) State CR equations in polar co-ordinates

(e) Find $L(sin^3 3t)$

(f) State change of scale property of Laplace transform.

(g) What is the coefficient of sinnx in the fourier series representation of $x - x^2$ from $x = -\pi$ and $x = \pi$

(h) Write the expressions for $j_o(x)$ and $j_1(x)$

(i) Solve $p + q = 0$

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

PART B (8×5)

Q. 2. Obtain the fourier series for the function f(x) given by $f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \le x \le 0 \\ 1 - \frac{2x}{\pi}, & 0 \le x \le \pi \end{cases}$ Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} \ldots\ldots = \frac{\pi^2}{8}$ CO a

OR

Find the fourier series for $f(x) = |sinx|$, $-\pi < x < \pi$ CO a

Q. 3. Find the analytic function f(z) = u + i v given that $u + v = \frac{sin2x}{\cosh 2y - cos2x}$ COb

OR

Prove that $\int_0^{\pi} \frac{ad\theta}{a^2+sin^2\theta} = \frac{\pi}{\sqrt{1+a^2}}$, a > 0 COb

Q. 4. The points of trisection of a string are pulled aside through the same distance on opposite sides of the position of equilibrium and the string is released from rest. Derive an expression for the displacement of the string at subsequent time and show that the mid-point of the string always remains at rest. COc

OR

Solve the p.d.e $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = x^2y^2$ COc

Q. 5. Solve the equation , using laplace transform $(D^2 - 3D + 2)y = 4t + e^{3t}$, y(0) = 1 & $y'(0) = -1$ COd

OR

Find $L(t\ sinht\ sin3t)$ COd

Q. 6. Solve $(1 - x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$ COe

OR

Show that $\int j_3(x)dx = -j_2(x) - \frac{2}{x}j_1(x) + c$ COe