Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. …….

Program: B.Tech.
Semester: 3rd
Name of Subject: Engineering Mathematics-111
Subject Code: BSEC-101
Paper ID: 16030

Time Allowed: 02 Hours **Max. Marks: 60**

19-07-21(E)

NOTE:

1) Each question is of 10 marks.
2) Attempt any six questions out of nine
3) Any missing data may be assumed appropriately

Q1. a) Apply convolution theorem to evaluate $L^{-1}(\frac{s}{(s^2+4)(s^2+9)})$. (5)

(b) Find Laplace transform of sin $(\sqrt{t})$. (5)

Q2. Solve the following differential equation using Laplace transform:

$$\frac{d^2x}{dt^2} + 5\frac{dx}{dt} + 6x = 5e^t, \qquad x(0) = 2, x'(0) = 1.$$

Q3. Solve the following partial differential equation:

$$2\frac{\partial^2 z}{\partial x^2} - 5\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = 5\sin(2x + y)$$

Q4. Using De- Moivre's theorem find all the roots of the equation

$$(1 + x)^{2n} + (1 - x)^{2n} = 0$$

Q5. Find the deflection $y(x,t)$ of the vibrating string of length π and ends fixed, corresponding to zero initial velocity and initial deflection $f(x) = k(sinx - sin2x)$ given $c^2 = 1$.

Q6. Evaluate the following integral using calculus of residues:

$\int_0^{2\pi} \frac{d\theta}{a+bsin\theta}$, where $a > |b|$.

Q7. If $f(z) = u + iv$ be an analytic function, find $f(z)$ in terms of z if $v = \log(x^2 + y^2) + x - 2y$.

Q8. Let V and W be vector spaces over F. Prove that $T: V \to W$ is a linear transformation if and only if $T(\alpha_1 v_1 + \alpha_2 v_2) = \alpha_1 T(v_1) + \alpha_2 T(v_2)$, where $\alpha_1, \alpha_2 \epsilon F$ and $v, v_2 \epsilon V$.

Q9. Solve in series the following differential equation:

$$3x\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$$

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