Exam.Code:0906
Sub. Code: 7025

1019

B.E., 2nd Semester

AS-201: Engineering Math – II (OLD)

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, selecting atleast two questions from each Part.

x-x-x

PART A

1. (a) Solve the following differential equations: (3+3)

(i) $\frac{dy}{dx} = \frac{2x+3y+1}{3x-2y-5}$

(ii) $(xy\sin xy + \cos xy)ydx + (xy\sin xy - \cos xy)xdy = 0.$

(b) Find the Laplace transform of $f(t) = \frac{e^{-at} - e^{-bt}}{t}$. (4)

2. (a) Find the general solution of the ordinary differential equation (5)

$$(D^2 - 5D + 6)y = xe^{4x}$$

(b) Find the general solution of the differential equation using method of variation of parameters: (5)

$$(D^2 + 4)y = \sec 2x$$

3. (a) Solve the differential equation using Laplace transform: (5)

$$ty'' + 2y' + ty = cost, \quad y(0) = 1$$

(b) Find the general solution of the differential equation: (5)

$$(D^3 - 2D + 4)y = x^4 + 3x^2$$

4. (a) Evaluate $L\left[\int_0^t \int_0^t \int_0^t \cos(au)du\,du\,du\right]$. (5)

(b) Evaluate $L^{-1}[\frac{1}{s^3 - a^3}]$. (5)

PART B

5. (a) Prove that (5)

$$\int_0^\infty \frac{\sin(\pi w)\ sin(xw)}{1-w^2}dw = \begin{cases} \frac{\pi}{2}\ sin(x) & \text{if } 0 \le x \le \pi \\ 0 & \text{if } x > \pi \end{cases}$$

(b) Find the Fourier series of the periodic function $f(x)$ defined below, with period $p = 2$ (5)

$$f(x) = 1 - |x|, (-1 < x < 1)$$

6. (a) Find the general solution of the following partial differential: (7)

$$x(z + 2a)\ p + (zx + 2yz + 2ay)\ q = z(z + a).$$

P.T.O.

(b) Formulate the partial differential equation by eliminating the arbitrary constants: (3)

$$ax^2 + by^2 + z^2 = 1,\ a, b \text{ arbitrary constants}$$

7. Find the D'Alemberts Solution of one dimensional wave equation for an elastic string of length L. (10)

8. (a) Find the Fourier series for the following period function $f(x) = x^2$, $(-1 < x < 1)$ $p = 2$ and hence find the sum of the following series (7)

$$1 - \frac{1}{4} + \frac{1}{9} - \frac{1}{16} + - \cdots$$

(b) Formulate the partial differential equation by elimination of arbitrary function: (3)

$$z = yf\left(\frac{y}{x}\right)$$

x-x-x