[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2067)

17002(M)

B. Tech 2nd Semester Examination

Engineering Mathematics-II (CBS)

MA-202

Time : 3 Hours Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each unit. Question no. 9 is compulsory. All units carry equal marks.

UNIT - I

1. (a) Solve $(y\log y)dx + (x - \log y)dy = 0$

   (b) Find the complete solution of $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 3y = e^x \cos x$ (12)

2. (a) Using the method of variation parameters, solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - y = e^x \log x$

   (b) Solve the Legendre's Linear equation $(2x-1)^2 \frac{d^2y}{dx^2} + (2x-1)\frac{dy}{dx} - 2y = 8x^2 - 2x + 3$ (12)

UNIT - II

3. (a) Solve the Bessel's equation $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + (x^2 - n^2)y = 0$ when n is an integer.

   (b) Show that $J_0^2 + 2J_1^2 + 2J_2^2 + 2J_3^2 + \ldots = 1$ where J_i is a Bessel's function of order i = 0.1.2.3 . . (12)

4. (a) Find the solution of the Legendre's differential equation $(1-x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + n(n+1)y = 0$ where n is a real no.

   (b) Solve the recurrence relation $\frac{d}{dx}\left[x^n J_n(x)\right] - x^n J_{n-1}(x) = 0$. (12)

UNIT - III

5. (a) (i) Find the Laplace transform of $\int_0^t \frac{e^{-t}\sin t}{t} dt$

   (ii) Find the Laplace transform of $t^2 e^{-3t} \sin 2t$.

   (b) Solve by the method of Laplace transform, the equation $t\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + ty = \cos t$ given that y(0)=1. (12)

6. (a) Evaluate $\int_0^\infty te^{-2t}\cos dt$ by using the definition of Laplace transform.

   (b) Find the inverse Laplace transform of $\frac{1}{(s+2)(s+3)}$. (12)

UNIT - IV

7. (a) If f(x) = |cos x|, expand f(x) as a Fourier series in the interval $(-\pi, \pi)$.

   (b) Find a Fourier series to represent x^2 in the interval $(-l, l)$. (12)

[P.T.O.]

8. (a) Solve the PDE $\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + 4\frac{\partial^2 z}{\partial y^2} = e^{2x+y}$.

(b) Solve the PDE $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = \cos(2x + y)$. (12)

UNIT - V

9. (i) Define Unit Step Function and Find their Laplace Transform.

(ii) State second Shifting Theorem of Laplace Transform.

(iii) Write the period of sin2x and tan2x.

(iv) Define even and odd function with examples.

(v) Differentiate Singular and Regular Singular Point of a second order ordinary differential equation.

(vi) How integrating factor helps to solve the differential equation? (6×2=12)