USN

15MAT21

Second Semester B.E. Degree Examination, Dec;z_to an.2020

Engineering Mathematics - II

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-I

1 a. Solve $\frac{d^3y}{dx^3}$ = Cosh (2x -1) + by inverse differential operators method. **(06 Marks)**

b. Solve $(D^3 - 1)y = 3 \cos 2x$ by inverse differential operators method. **(05 Marks)**

c. Solve $(D^2 + a^2)\, y = \sec(ax)$ by the method of variation of parameters. **(05 Marks)**

OR

2 a. Solve $(D^2 - 2D + 5)\, y = e^{x} \sin x$ by inverse differential operator method. **(06 Marks)**

b. Solve $(D^3 + D^2 + 4D + 4)\, y = x^2 - 4x - 6$ by inverse differential operator method. **(05 Marks)**

c. Solve $y'' - 2y' + 3y = x^2 - \cos x$ by the method of undetermined coefficients. **(05 Marks)**

Module-2

3 a. Solve $x^3 y''' + 3x^2 y'' + xy' + 8y = 65 \cos(\log x)$ **(06 Marks)**

b. Solve $xy\left(\frac{dy}{dx}\right)^2 - \left(x^2 + y^2\right)\frac{dy}{dx} + xy = 0$ **(05 Marks)**

c. Solve the equation $(px - y)(py + x) = 2p$ by reducing into Clairaut's form taking the substitution $X = x^2, Y = y^2$. **(05 Marks)**

OR

4 a. Solve $(2x-1)^2 y'' + (2x-1)y' - 2y = 8x^2 - 2x + 3$ **(06 Marks)**

b. Solve $y = 2px + p^2 y$ by solving for 'x'. **(05 Marks)**

c. Find the general and singular solution of equation $xp^2 - py + kp + a = 0$. **(05 Marks)**

Module-3

5 a. Obtain partial differential equation by eliminating arbitrary function.

Given $z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$ **(06 Marks)**

b. Solve $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$, given that u = 0 when t = 0 and $\frac{\partial u}{\partial t} = 0$ at x = 0. **(05 Marks)**

C. Derive one dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ **(05 Marks)**

OR

6 a. Obtain partial differential equation of

$f(x^2 + 2yz,\ y^2 + 2zx) = 0.$ **(06 Marks)**

b. Solve $\frac{\partial^2 z}{\partial x^2} = a^2 z$, given that when x = 0, z = 0 and $\frac{\partial z}{\partial x} = a \sin y$. **(05 Marks)**

c. Find the sOlution of one dimensional heat equation at C - 32 u ax **(05 Marks)**

Module-4

7 a. Evaluate 1-X 0 0 dx dy dx (1 + x + y + z) 3 **(06 Marks)**

b. Evaluate integral , X X xy dy dx by changing the order of integration. **(05 Marks)**

e. Obtain the relation between Beta and Gamma function in the form 13(m, n) — rn im+n **(05 Marks)**

OR

8 a. Evaluate JJ 0 0 e x *' t 2 2) dxdy by changing into polar co-ordinates. **(06 Marks)**

b. If A is the area of rectangular region bounded by the lines x = 0, x = 1, y = 0, y = 2 then evaluate 1((2 + y 2)dA A **(05 Marks)**

c. Evaluate '2 fl dO VSin 0 f. 2 0 v Sin 0 dO using Beta and Gamma functions. **(05 Marks)**

Module-5

9 a. Find Laplace transition of i) t 2 e 2t ii) — c **(06 Marks)**

b. If a periodic function of period 2a is defined by f(t) = { t if 0 < t < a } { 2a — t if a < t < 2a

Then show that Lif(t)i= --.-, I s tan h(Ls). 2 **(05 Marks,—**

Solve y"(t) + 4yr(t) + 4y(t) = e' with y(0) = 0 y I (0) = 0. Using Laplace transform. **(05 Marks)**

OR

10 a- Find LI 7s (4s - + 4s +9) **(06 Marks)**

b. Find (s —1)(s - +) using convolution theorem. **(05 Marks)**

c- Express the following function interms of Heaviside unit step function and hence its Laplace transistor f(t 0 < t 2 4t, t > 2 **(05 Marks)**