CBCS SCHEME

USN

17MAT21

econd Semester B.E. Degree Examination, June/July 2019

Engineering Mathematics -

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Solve $(D^2+1)y = 3x^2 + 6x + 12$. **(06 Marks)**

b. Solve $(D^3 + 2D^2 + D)y = e$. **(07 Marks)**

c. By the method of undetermined coefficients, solve $(D^2 + D - 2)y = x + \sin x$. **(07 Marks)**

OR

2 a. Solve $(D^2 - 6D + 9)y = 6e^{3x} + 7e^{2x}$. **(06 Marks)**

b. Solve $(D^3 - D)y = (2x + 1) + 4\cos x$. **(07 Marks)**

c. By the method of variation of parameters, solve $(D^2 + 1)y = \operatorname{cosec} x$. **(07 Marks)**

Module-2

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

b. Solve $xyp^2 - (x^2 + y^2)p + xy = 0$. **(07 Marks)**

c. Solve $(px - y)(py + x) = a^2p$ by taking $x^2 = x$ and $y^2 = y$. **(07 Marks)**

OR

4 a. Solve $(2+x)^2 y'' + (2+x)y' + y = \sin(2\log(2+x))$. **(06 Marks)**

b. Solve $yp^2 + (x - y)p - x = 0$. (07 Marks)

c. Obtain the general and singular solution of the equation $\sin px \cos y = \cos px \sin y + p$. (07 Marks)

Module-3

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

$lx + my + nz = \phi(x^2 + y^2 + z^2)$ **(06 Marks)**

b. Solve $\frac{\partial^2 z}{\partial x^2} = xy$ subject to the conditions $\frac{\partial z}{\partial x} = \log(1+y)$ when $x = 1$ and $z = 0$ when $x = 0$. **(07 Marks)**

c. Derive an expression for the one dimensional wave equation. **(07 Marks)**

OR

6 a. Form a partial differential equation $z = f(y + 2x) + g(y - 3x)$ **(06 Marks)**

b. Solve $\frac{\partial^2 z}{\partial y^2} = z$, given that when $y = 0$, $z = e^x$ and $\frac{\partial z}{\partial y} = e^{-x}$ **(07 Marks)**

c. Find all possible solutions of heat equation $u_t = c^2 u_{xx}$ by the method of separation of variables. **(07 Marks)**

17MAT2

Module-4

7 a. Evaluate if r sin 0 dr dO over the cardioids r = a(1 — cos° above the initial line. (06 Marks)

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b. Evaluate .1 x dz dx dy (07 Marks)

c. Derive the relation between Beta and Gamma function as B(m, n) = $\frac{F(m)F(n)}{F(m+n)}$. (07 Marks)

OR

8 a. Evaluate by changing the order of integration if ___ dydx . (06 Marks)

0 Y

b. Find by double integration, the area lying between the parabola $y = 4x - x^2$ and the line y = x. (07 Marks)

C. Show that Vcot 0 de = 2 (i4) (34) (07 Marks

Module-5

9 a. Find the Laplace transform of t cos 2t + $\frac{1-e^{31}}{t}$ (06 Marks)

b. Find the Laplace transform of f(t) = Esin cot , 0 < t < having the period It (07 Marks)

C. Solve y" — 3y' + 2y = 2e" , y(0) = y'(0) = 0 by using Laplace transforms. (07 Marks)

OR

10 a. Find the inverse Laplace transforms of $\frac{s+}{2s+2}$ + log $\left(\frac{s+a}{s+b}\right)$ (06 Marks)

b. By using convolution theorem, find L^{-1} $\frac{}{+ I)(s-l)}$ (07 Marks)

c_ Express f(t) = { sin t, 0< t s ; cos t, Y < t TC ; < t } in terms of unit step functions and hence find its Laplace transform_ (07 Marks)

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