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CBCS SCHEME

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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 $(2+X)^2y'' + (2+x)y' + y = \sin(2\log(2+x))$. **(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
$lx + my + nz = 4)(x^2 + y^2 + z^2)$ **(06 Marks)**

b. Solve $\frac{a2z}{ax^2} = x_y$ subject to the conditions $\frac{az}{aX}$ --- $\log(1+y)$ when x - I and z = 0 when x = O. **(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 $-\frac{a2z}{ay} = z$, given that when y = 0, z =ex and $\frac{a}{ay}$ - - -' **(07 Marks)**

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

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 $\int_{1}$ 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 $\int_{0} \frac{}{Y}$ dydx . **(06 Marks)**

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 $\overset{2}{V}\overline{\text{cot } 0}$ de = 2 $\sqrt{(i4)}$ $\sqrt{(\tfrac{3}{4})}$ **(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 $1.^{-1}$ $\frac{}{+1)(s-1)}$ **(07 Marks)**

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

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