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CBCS SCHEME

USN 15MAT21

Second Semester B.E. Degree Examination, June/July 2019
Engineering Mathematics – II

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Solve $(D^2 - 4D + 4)y = e^{2x} + \cos 2x + 4$ by inverse differential operator method. (06 Marks)

b. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = e^{x}\sin x$ by inverse differential operator method. (05 Marks)

c. Using the method of undetermined coefficients, solve $y'' - 3y' + 2y = \; + e^x$. (05 Marks)

OR

2 a. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$ by inverse differential operator method. (06 Marks)

b. Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} +$ by inverse differential operator method. (05 Marks)

c. Solve $y'' - 2y' + y = \frac{e}{}$ by method of variation of parameters. (05 Marks)

Module-2

3 a. Solve $(2x-1)^2\frac{d^2y}{dx^2} + (2x-1)\frac{dy}{dx} - 2y = 8x^2 - 2x + 3$. (06 Marks)

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

c. Solve $x^2(y - px) - p^2y$ by reducing into Clairaut's form and using the substation $X = x^2$ and $Y =$ (05 Marks)

OR

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

b. Obtain the general solution of the differential equation $p^2 + 4x^5p - 12x^4y = 0$. (05 Marks)

c. Obtain the general and singular solution of $y = 2px + p^2y$. (05 Marks)

Module-3

5 a. Form the partial differential equation by eliminating the arbitrary function from the relation $Z = y f(x) + x g(y)$. (06 Marks)

b. Solve $\frac{}{\partial x \partial y} = \; x \sin y$ for which $\frac{\partial z}{\partial y} = -2\sin y$ when $x = 0$ and $z = 0$ when y is an odd multiple of $\pi/2$. (05 Marks)

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

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OR

6 a. Form a partial differential by eliminating the arbitrary function (I) from the relation 4)(x ^{2} +y ^{2} +z ^{2} ,z2 _ 2xy) = 0 . **(06 Marks)**

b. Solve $\frac{a^2 z}{ax^2}$ + 4z = 0 , given that when x = 0, z = e'" and $\frac{az}{ax}$ = 2 **(05 Marks)**

c. Determine the solution of the heat equation $\frac{au}{at}$ = c ^{2} $\frac{a^2 u}{aK2}$ by the method of separation of variables for the constant K is positive. **(05 Marks)**

Module-4

7 a. Evaluate if (xy + e)dydx (24, 1) **(06 Marks)**

b. Evaluate (4a 2\ ax, 0 x ^{2} /4a) dydx by changing the order of integration. **(05 Marks)**

c Obtain the relation between the beta and gamma function in the form

p(m,n)= $\frac{km) -1(0}{l(ni+n)}$ **(05 Marks)**

OR

8 a. Evaluate fJe ^{4,2} dxdy by changing into polar coordinates. (x, 0 0) **(06 Marks)**

Evaluate fe` `Y"dzdydx (1 x, J 0 0) **(05 Marks)**

c. Using beta and gamma function, prove that $\int_0 \frac{x^2}{-x^4}$ dx x $\frac{y}{-}$,-J1+ x ^{4} 4-\12 **(05 Marks)**

Module-5

9 a. Find L $\left| \frac{}{t} \right.$ + t sin t **(06 Marks)**

b. If f(t) t / 2m 0 tsrm , where gt + 2n) = f(t), then prove that L{f(t) = $\frac{1}{s}$ tan h $\frac{lts}{2}$ **(05 Marks)**

c. Find r ^{i} $\left| \frac{s}{s^2 \pm a^2)^2} \right|$ using convolution theorem. **(05 Marks)**

OR

10 a. Express f(t) = { 0 < t < 1 ; t 1 < t < 2 ; t > 2 } in term of unit step function and hence find its Laplace transform. **(06 Marks)**

b. Find L-` $\frac{s+5}{s^2 -6s+13}$. **(05 Marks)**

c. Employ the Laplace transform to solve the differential equation y"(t)+ 4y'(t)+4y(t)= e' with the initial condition AO) = 0 and y'(0) = 0. **(05 Marks)**

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