CBCS SCHEME

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17MAT21

Second Semester B.E. Degree Examination, Dec.2019/Jan.2020
Engineering Mathematics - II

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Solve $\frac{d^3y}{dx^3} - 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} - 6y = 0$ (06 Marks)

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

c. Solve $(D^2 + 1)y = \sec x$ by the method of variation of parameters. (07 Marks)

OR

2 a. Solve $(D^3 - 9D^2 + 23D - 15)y = 0$ (06 Marks)

b. Solve $y'' - 4y' + 4y = 8(\sin 2x + x^2)$ (07 Marks)

c. Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 4y = 2x^2$ by the method of undetermined coefficients. (07 Marks)

Module-2

3 a. Solve $(x^2D^2 + xD + 1)y = \sin(2\log x)$ (06 Marks)

b. Solve $x^2p^2 + 3xyp + 2y^2 = 0$ (07 Marks)

c. Find the general and singular solution of Clairaut's equation $y = xp + p^2$. (07 Marks)

OR

4 a. Solve $(2x + 1)^2 y'' - 2(2x + 1)y' - 12y = 6x$ (06 Marks)

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

c. Find the general solution of $(p - 1)e^{3x} + p^3 e^{2y} = 0$ by using the substitution $X = e^x$, $Y = e^y$. (07 Marks)

Module-3

5 a. Form the partial differential equation by eliminating the function from $Z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$ (06 Marks)

b. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ for which $\frac{\partial z}{\partial y} = -2\sin y$ when $x = 0$ and $z = 0$ when y is an odd multiple of $\frac{\pi}{2}$ (07 Marks)

c. Derive one dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = c^2\frac{\partial^2 u}{\partial x^2}$ (07 Marks)

OR

6 a. Form the partial differential equation by eliminating the function from $f(x + y+z, x^2 +3/^2 + z^2) = 0$ **(06 Marks)**

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

c. Obtain the variable separable solution of one dimensional heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$. **(07 Marks)**

Module-4

7 a. Evaluate $\int_0^1 \int_1^2 (x^2 + 3/^2)\, dx\, dy$ **(06 Marks)**

b. Evaluate $\int_0 \int_x dydx$ by changing the order of integration. **(07 Marks)**

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

OR

8 a. Evaluate $\int \int f(x2 + \quad +)dx\, dydz$ **(06 Marks)**

b. Find the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$. **(07 Marks)**

c. Prove that $\int_0^{\pi/2} \sqrt{\sin\theta}\, d\theta \times \int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} = \pi$ **(07 Marks)**

Module-5

9 a. Find the Laplace transform of $\frac{\text{Cosat} - \text{Cosbt}}{t}$ **(06 Marks)**

b. Express the function $f(t) = \begin{cases} \text{Sint} & 0<t<\frac{\pi}{2} \\ \text{Cost} & t > \pi/2 \end{cases}$ in terms of unit step function and hence fins, Laplace transform. **(07 Marks)**

c. Find $L^{-1}\left[\frac{s + 2}{s^2 - 2s+5}\right]$ **(07 Marks)**

OR

10 a. Find the Laplace transform of the periodic function $f(t) = t^2, 0 < t < 2$. **(06 Marks)**

b. Using convolution theorem obtain the Inverse Laplace transform of $\frac{1}{s^2(s^2 + 1)}$ **(07 Marks)**

c. Solve by using Laplace transform $y'' + 4y' + 4y = e^t$. Given that $y(0) = 0, y'(0) = 0$. **(07 Marks)**