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15MAT21

Second Semester B.E. Degree Examination, June/July 2017
Engineering Mathematics – II

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Solve : $\frac{d^2y}{dx^2} - 4y = \cosh(2x-1) + 3^x$. (05 Marks)
 b. Solve : $(D^2 - 4D + 3)y = e^{2x} \cdot \cos 3x$. (05 Marks)
 c. Apply the method of undetermined coefficients to solve $y'' - 3y' + 2y = x^2 + e^x$. (06 Marks)

OR

- 2 a. Solve : $(D^4 - 1)y = 0$. (05 Marks)
 b. Solve : $(D^2 - 4D + 4)y = 8(e^{2x} + \sin 2x)$. (05 Marks)
 c. By the method of variation of parameters solve $y'' - 6y' + 9y = \frac{e^{3x}}{x^2}$. (06 Marks)

Module-2

- 3 a. Solve : $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = \log x$. (05 Marks)
 b. Solve : $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$. (05 Marks)
 c. Solve $(px - y)(py + x) = 2p$ by reducing it into the Clairaut's form by taking the substitution $X = x^2$, $Y = y^2$. (06 Marks)

OR

- 4 a. Solve : $(1+x^2)y'' + (1+x)y' + y = \sin\{\log(1+x)^2\}$. (05 Marks)
 b. Obtain the general solution and the singular solution of the equation $p^2 + 4x^5p - 12x^4y = 0$. (05 Marks)
 c. Show that the equation $xp^2 + px - py + 1 - y = 0$ is a Clairaut's equation. Hence obtain the general solution and the singular solution. (06 Marks)

Module-3

- 5 a. Form a partial differential equation by eliminating ϕ and ψ from the relation $z = x\phi(y) + y\psi(x)$. (05 Marks)
 b. Solve $\frac{\partial^2 z}{\partial x^2} - a^2 z = 0$ under the conditions $z = 0$ when $x = 0$ and $\frac{\partial z}{\partial x} = a \sin y$ when $x = 0$. (05 Marks)
 c. Derive an expression for the one dimensional heat equation. (06 Marks)

OR

- 6 a. Form a partial differential equation by eliminating ϕ from $\phi(x+y+z, xy+z^2) = 0$. (05 Marks)
 b. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ given that $\frac{\partial z}{\partial y} = -2 \sin y$, when $x = 0$ and $z = 0$ when y is an odd multiple of $\frac{\pi}{2}$. (05 Marks)