Marks: 50.00

Cat. No: Base.1205.

Time: 2 hours

Title: Engineering Mathematics II (3+0)

(10x1=10)

I Answer all questions

A. Fill up the blanks for the following

1. $\frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} +$ ------------------ converges for -----------------------

2. The solution of ordinary differential equation $xdy + ydx = 0$ is --------------------

3. The value of $\frac{1}{f(D^2)} \cos ax$ is -----------------------

4. $\frac{1}{D^2 - 4D + 4} e^{3x} =$ -----------------------

B. Match the following

A	B
5. One dimensional wave equation	$(ax + b)^2 \frac{d^2y}{dx^2} + A(ax + b)\frac{dy}{dx} + By = f(x)$
6. One dimensional heat equation	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$
7. Laplace equation	$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$
8. Legendre's equation	$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$

C. True or False

9. The series $1+2+3+$ ....$+n+$..............is convergent

10. $x = 0$ is a regular point of $\frac{dy}{dx} + xy = 0$

II Write short notes/answers on any FIVE of the following   (5x2=10)

1. Solve $x\frac{dy}{dx} + y = x^3 y^6$

2. Solve $(D^2 + 5D + 6)y = e^x$

3. Solve $p(1 + q) = qz$

4. Find $P_2(x)$ from $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n$

5. Solve $x(y - z)p + y(z - x)q = z(x - y)$

6. Write any two assumptions in deriving one dimensional wave equation

7. Test the convergence of $1 + \frac{1}{2^2} + \frac{2^2}{3^3} + \frac{3^3}{4^4} +$ ... ...

III Write short answers on any FIVE $(5x4=20)$

1. Solve by method of variation of parameters $\frac{d^2y}{dx^2} + 16y = \text{cosec } 4x$

2. Solve the equation $py = xp^2 + a$ where $p = \frac{dy}{dx}$

3. Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = 2 \sin \log(1 + x)$

4. Derive a partial differential equation $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$

5. Solve $x(y - z)p + y(z - x)q = z(x - y)$

6. Test the convergence of the series $\frac{1}{3} + \frac{1.2}{3.5} + \frac{1.2.3}{3.5.7} + \cdots$

7. Discuss the convergence of $\sum_{n=1}^{a} \frac{n^2}{2^n}$

IV Write essay on any ONE $(1x10=10)$

1. Derive one dimensional Heat equation and solve it.

2. Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \, \partial y} - 6\frac{\partial^2 z}{\partial y^2} = \cos(2x + y)$.

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