Basc. 1205

Marks: 50
Time: 2 hours
(10x1=10)

I **Fill up the blanks**

1 Convergence of an infinite series remains unaffected by multiplying each term by a -------

2 Raabe's test is applied when the --------------- test fails.

3 If the series $1 + \dfrac{1}{2^2} + \dfrac{1}{3^2} + \dfrac{1}{4^2} + \dfrac{1}{5^2} + \ldots\ldots$ convergent, then the series

$1 - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + \dfrac{1}{5^2} + \ldots\ldots$ is ----------------- .

4 Condition for the exact differential equation $\text{M}dx + \text{N}dy = 0$ is ----------------.

5 Clairaut's equation is of the form ------------------------.

6 Basis of solutions of the homogeneous ordinary differential equation on any interval is $y_1 = \cos x$ and $y_2 = \sin x$. Then the Wronskian $W(y_1, y_2)$ is -----------.

7 Bessel's equation is of the form ------------------------.

8 Elimination of one arbitrary constant from a given relation leads a ----------order partial differential equation.

9 A solution in which the number of arbitrary constants is equal to the number of independent variables is called --------------------.

10 Order of Laplace, Heat and Wave equation is -------------.

(5x2=10)

II **Write Short notes on any FIVE of the following**

1 Define a bounded sequence and monotonic sequence.

2 Write any two properties of a series.

3 Reduce the ODE $xdy - ydx = 0$ into exact equation and find the solution.

4 Solve the non homogeneous ODE $y'' + y = \sec x$ by method of variation of parameters.

5 Write the Lagrange's linear partial differential equation and its subsidiary equation.

6 Write the one dimensional heat equation and its correct solution which satisfies all the boundary conditions.

7 Write three possible solutions of a Laplace equation.

P.T.O

III   **Answer any FIVE of the following.**

1   Test the convergence of the series $\sum \dfrac{4.7...(3n+1)}{1.2....n}x^n$ by Raabe's test.

2   Define absolutely convergent series. Test whether the series $\sum\limits_{n=2}^{\infty} \dfrac{(-1)^n}{n(\log\ n)^2}$

is absolutely convergent or not?

3   Define linear differential equation and its order and degree.

4   Solve $y' - y = 0$ by power series solution technique.

5   Solve: $px + qy = z$

6   Form the partial differential equation by eliminating the arbitrary constants in

$z = (x-a)^2 + 1 + (y-b)^2.$

7   Define a second order homogeneous linear partial differential equation with constant

coefficients. Solve $2\dfrac{\partial^2 z}{\partial x^2} + 5\dfrac{\partial^2 z}{\partial x \partial y} + 2\dfrac{\partial^2 z}{\partial y^2} = 0.$

(1x10=10)

IV   **Answer any ONE of the following**

1   Solve $(D^3 - 3D^2 + 3D - 1)y = x^2 e^x.$

2   Solve the Legendre's linear equation $(2x-1)^2 \dfrac{d^2y}{dx^2} + (2x-1)\dfrac{dy}{dx} - 2y = 8x^2 - 2x + 3.$

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