Internal Examination 2023

Department of Mathematics

Nabadwip Vidyasagar College

Semester-II, Paper: CC-03(Real Analysis) F.M.-20, Time-1hours

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Answer all the questions. $\mathbf{4 \times 5 = 20}$

1. Show that the set of all real numbers is uncountable.
2. Define open set. Is arbitrary intersection of open set always open ? Justify your answer.
3. Prove that the series $\sum \left\{\frac{2.4.6.8\ldots 2n}{3.5.7.9\ldots(2n-1)}\right\}^2$ diverges.
4. Using Cauchy's principle prove that the series $\sum \frac{1}{n!}$ Converges.

Semester-II, Paper: CC-04(Differential Equations) F.M.-20, Time-1hours

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Solve the following differential equations. $\mathbf{4 \times 5 = 20}$

1. $(D^2 - 2D + 1)y = xe^x$
2. $x^3 \frac{d^3y}{dx^3} - x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 2y = x^3$
3. Solve by variation by parameter
   $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = \frac{1}{x^2 e^x}$.
4. $\frac{dx}{x^2 - y^2 - z^2} = \frac{dy}{2xy} = \frac{dz}{2xz}$.