B.Sc. Honours Internal Evaluation- 2020

(Under CBCS Pattern)

Semester-II

Subject-Mathematics

Paper-C4T: Differential Equations & Vector Calculus

Candidates are required to give their answer in their own words as far as practicable. Questions are of equal value.

Full marks-30

Answer any five question from the following:

1. Solve by the method of undetermined coefficients
$$\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 4y = 8x^2 + 3 + 2\cos 2x$$
2. Show that x=0 is a regular singular point of
$$(2x + x^3)\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6xy = 0$$
And find its solution about x=0.
3. Solve $\frac{dx}{mz-ny} = \frac{dy}{nx-lz} = \frac{dz}{ly-mx}$.
4. Solve $(D^2+4)y = \sin 2x$.
5. Find the directional derivative of $\Phi = xy^2z + 4x^2z$ at (-1, 1, 2) in the direction $(2\hat{\imath} + \hat{\jmath} - 2\hat{k})$.
6. Evaluate $\iint F.n\, ds$, where $F = 6z\hat{\imath} - 4\hat{\jmath} + y\hat{k}$ and S is that part of the plane 2x+6y+3z=10, which is located in the first octant.
7. Show that $\nabla.r = 3$ and $\nabla.(r^3\mathbf{r}) = 6r^3$ where $r = \sqrt{x^2 + y^2 + z^2}$ and $\mathbf{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$.
8. Find unit vectors in the plane of $\vec{\alpha} = \hat{\imath} + 2\hat{\jmath} - \hat{k}$, $\vec{\beta} = \hat{\imath} + \hat{\jmath} - 2\hat{k}$ that is perpendicular to the vector $\vec{\gamma} = 2\hat{\imath} - \hat{\jmath} + \hat{k}$.