

2. Define the terms :

Osculating plane, point of inflexion, inflexional line.

3. A helicoid is generated by the screw motion of a straight line skew to the axis. Find the curve coplanar with the axis which generates the same helicoid.

4. Explain the concept of angle between curves and state the expressions for the angle between parametric curves.

5. Explain the 'second fundamental form'.

6. What is an umbilic? - Explain. State a property of a point which is not an umbilic.

7. Find a particular solution of the equation

$$y'' - y' - 6y = e^{-x},$$

first by undetermined co-efficients and then by variation of parameters.

8. Find the general solution of the equation

$$y'' - 3y' + 2y = 14 \sin 2x - 18 \cos 2x.$$

9. Locate and classify the singular points of the equation

$$x^3(x-1)y'' - 2(x-1)y' + 3xy = 0.$$

10. Prove that :

$$J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$$

$$\text{and } J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \cos x.$$

### SECTION - B (3 × 20 = 60)

Answer any *THREE* questions.

Each question carries *TWENTY* marks.

11. (a) State and prove the fundamental existence theorem for space curves.

(b) Prove that a space curve is a helix if and only if, the ratio of the curvature to torsion is constant at all points.

12. (a) Find a surface of revolution which is isometric with a region of the right helicoid.

Turn over