S. NO.: 93 BATCH: 2014, 2015 Reg. No.:

END OF SEMESTER EXAMINATIONS, APRIL / MAY - 2017
DIFFERENTIAL GEOMETRY
SUBJECT CODE : 14P3MA15

MAJOR : M.Sc. (MATHS) **SEMESTER : IV**
TIME : 3 HOURS **MAX. MARKS: 70**

SECTION A – (5 X 4 = 20)

Answer All the Questions:

1. Find the equation of the osculating plane of circular helies.

[OR]

2. Find the Torsion for the curve $x = u,\ y = u^2, z = u^3$.
3. Show that the projection of a Helix on a plane $\perp_r$ to axis has its principal normal parallel to the corresponding principal normal of the helix and its corresponding curvature is $k_1 = k \cos ec^{-2}\alpha$.

[OR]

4. Find the equation of the Involute.
5. Show that the parametric equation of given surface is not unique.

[OR]

6. Show that the edge of regression of tangential developable is the curve itself and the characteristic lines are its tangents.
7. Show that the lines of curvature of a surface of revolution are its radiants and parallels.

[OR]

8. Find the first fundamental form for the sphere of radius 'a'.
9. Show that the sphere is a only surface, all points of which are umbilics.

[OR]

10. Obtain the equation of Geodesic.

SECTION B – (5 X 10 = 50)

Answer All the Questions:

11. Show that the centre of osculating circle lies on the principal normal at a distance $|R|$ from p.

[OR]

12. State and prove Serrate - Frenct formula.
13. Find the centre and radius of the osculating sphere at any point on the curve $\bar{X} = \bar{X}(s)$.

[OR]

14. State and prove the Necessary and sufficient condition that the curve of constant slope is that the ratio of curvature to torsion is a constant.
15. Find the unit surface normal at any point on the circular cone and right helicoid.

[OR]

16. Show that the edge of regression of the polar developable is the locus of the centre of the osculating sphere.
17. State and prove Euler's theorem on normal curvature in an arbitrary direction.

[OR]

18. Obtain Weingarten equations.
19. Prove that Gaussian curvature of the surface is a Bending invariant.

[OR]

20. Derive Lioville's formula for the Geodesic curvature.

******