

Roll.No.

20PAMCT4011

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.

M.Sc.Applicable Mathematics - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - IV

20PAMCT4011 - Differential Geometry and Tensor Calculus

Total Duration : 2 Hrs. 30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Find the curvature and torsion of the cubic curve given by $r=(u, u^2, u^3)$.
2. Show that the curves of the family $\frac{v^2}{u^2} = c$ are geodesics on a surface with metric $v^2 du^2 - 2uvdudv + 2u^2 dv^2 (u > 0, v > 0)$.
3. If a transformation of coordinates T possesses an inverse and if J and K are the Jacobians of T and T^{-1} , respectively, then classify JK = 1.
4. If $g = |g_{ij}|$ then show that $\frac{\partial}{\partial x^i} \log \sqrt{g} = \left\{ \frac{\alpha}{i\alpha} \right\}$
5. Illustrate the general surface of revolution.
6. Apply Liouville's formula for k_g .
7. Interpret the sum of two tensors which have the same number of covariant and the same number of contravariant indices is again a tensor of the same type and rank as the given tensors.
8. Justify Ricci's theorem.

Section C

I - Answer any **TWO** questions ($2 \times 10 = 20$ Marks)

9. Compute the curvature and torsion of the curve of intersection of the two quadric surfaces. $ax^2 + by^2 + cz^2 = 1, a'x^2 + b'y^2 + c'z^2 = 1$.
10. (i) Predict $E'du'^2 + 2F'du'dv' + G'dv'^2 = Edu^2 + 2Fdudv + Gdv^2$
(ii) Solve the coefficients of the direction which makes an angle $\frac{1}{2}\pi$ with the direction whose coefficients are (l,m).
11. Justify Gauss-Bonnet theorem.
12. Appraise the law G of transformation of mixed tensors is transitive.

II - Compulsory question ($1 \times 10 = 10$ Marks)

13. Apply christoffel's symbols.
