

Question Bank for PG Course

অঙ্ক (Mathematics)

অষ্টম (ক) পত্র (Paper - VIIIA)

Differential Geometry : PGMT-VIIIA

1. Write the following expression in Einstein convention:

$$d\bar{x}^i = \sum_{j=1}^n \frac{\partial \bar{x}^i}{\partial x^j} dx^j$$

2. What is Kronecker Delta ?
3. Simplify the following expression $\delta_j^i A^j$.
4. Suppose the components of a contravariant tensor in the n-coordinate systems (x^1, x^2, \dots, x^n) and $(\bar{x}^1, \bar{x}^2, \dots, \bar{x}^n)$ are A^i and \bar{A}^i respectively. Then write down the transformation formula of their components.
5. Suppose the components of a covariant tensor in the n-coordinate systems (x^1, x^2, \dots, x^n) and $(\bar{x}^1, \bar{x}^2, \dots, \bar{x}^n)$ are A_i and \bar{A}_i respectively. Then write down the transformation formula of their components.
6. What is the order of the mixed tensor Kronecker Delta ?
7. If A_{jk}^i is a mixed tensor of order (1,2), then what is the order of the contracted tensor of A_{jk}^i ?
8. Let A_{ij} be a tensor and A^{ij} be its conjugate symmetric tensor. Then what is the value of $A_{ij}A^{ij}$?
9. What is the order of fundamental metric tensor?
10. What is the necessary and sufficient condition for two tensors A^i and B^i to be orthogonal?
11. What is the necessary and sufficient condition for a surface to be a developable?
12. What is the geodesic curvature of a geodesic on a surface?
13. What is the Gaussian curvature of a hyperbolic surface?
14. Is the length of a vector invariant?
15. If A^{ijl} and B^{abc} are components of two tensors of type (3,0), then what is the type of the outer multiplication $A^{ijl}.B^{abc}$?