SUBJECT CODE : MT/PE/TS33

M. Sc. DEGREE EXAMINATION, NOVEMBER 2010
BRANCH I - MATHEMATICS
THIRD SEMESTER

COURSE   : ELECTIVE
PAPER   : TENSOR ANALYSIS AND SPECIAL THEORY OF RELATIVITY
TIME   : 3 HOURS   MAX. MARKS : 100

SECTION – A   **(5 X 8 = 40)**
ANSWER ANY FIVE QUESTIONS

1. Show that $\dfrac{\partial A_p}{\partial x^q}$ is not a tensor .

2. If A_r^{pq} and B_r^{pq} are tensor, prove that their sum and difference are tensors.

3. Show that $L^2 = g_{pq} A^p A^q$ is an invariant.

4. Show that $g_{jk,q}$ [covariant derivative] is zero.

5. Explain coordinate transformation between the earth and Newton's Pail.

6. Explain the ether hypothesis.

7. Distinguish between inertial and non-inertial frame of reference. Give one example of each. Is earth an inertial frame of reference? Give reasons.

SECTION – B   **(3 X 20 = 60)**
ANSWER ANY THREE QUESTIONS

8. Derive transformation laws for the Christoffel symbols of

    (a) First kind   (b) second kind

9. Find the geodesic in a Riemannian space and show that that covariance derivative of A_p and A^p are tensors.

10. Explain Michel Son – Morley experiment.

11. Obtain Lorentz transformation equations.

12. Derive relativistic Lagrungian and Hamiltonian for a free particle.

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