

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**JUNE/JULY EXAMINATION**

**COURSE CODE: MTH303**

**COURSE TITLE: VECTORS AND TENSORS(3 units)**

**TIME ALLOWED:3 HOURS**

**INSTRUCTION: ANSWERS ANY 4 QUESTIONS**

1.(a) State which of the following are scalars and which are vectors

 Weight,calories,specfic-heat,momentun,density,energy,volume,displacement,velocity and magnetic field intesity**5 mark**

 (b) Given **,**and .Find the magnitudes of (i) 

 (ii)**12 ½ marks**

 2. (a) Evaluate each of the following (i)  (ii)**10 marks**

 (b) Determine a unit vector perpendicular to the plane of and-

**5 ½ marks**

3. (a) If and.Find (i)  (ii)**10 marks**

 (b) Show that  is a conservative force field -**7 ½ marks**

4. (a) (i) Find the unit tangent vector to the curve **8marks**

 (ii) Determine the unit tangent at the point where **4mrks**

 (b) If A and B are differentiable function of a scalar prove 

**5 ½ marks**

5. (a) Prove ,where F and G are differentiable scalar function of 

**5 ½ marks**

 (b) Find  if (i)  (ii)**12marks**

6. (a) If ,find  at the point (1,-1,1). **8 marks**

 (b) Given .(i)Find  (ii) Show ,where 

 denotes the laplacian**9 ½ marks**