**B.Tech Odd Semester (CBCS) Exam., 2016**

# ELECTRONICS AND COMMUNICATION ENGINEERING

**( 3rd Semester )**

Course No. : EC–CF–04

**( Electromagnetic Theory )**

*Full Marks* : 50

*Pass Marks* : 15

*Time* : 2 hours

*Note* :
1. Attempt *any* **five** questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the margin indicate full marks for the questions.

**1.** *(a)* State and prove divergence theorem.





*(b)* Verify Stokes' theorem for the vector function $\vec{A} \quad xy\vec{a}_x \quad 2yz\vec{a}_y \quad 3zx\vec{a}_z$ using triangular area shown in Fig. 1. 5+5

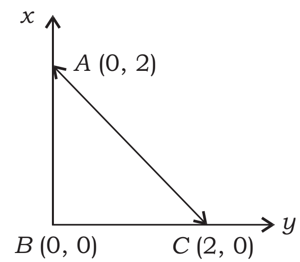


Fig. 1

**2.** *(a)* Explain Gauss' law of electrostatics.

*(b)* Derive the expression for electric field intensity due to infinite line charge distribution. 4+6

**3.** *(a)* Derive the expression for potential due to an infinite line charge.

*(b)* What is method of images? Write the properties of method of images. 5+5

**4.** *(a)* State and explain Biot-Savart law for static magnetic fields as applied to different types of current distribution.

*(b)* For the finite length current element, current in *z*-direction as shown in Fig. 2, use Biot-Savart law to find out the magnetic field intensity at point *P*. 5+5

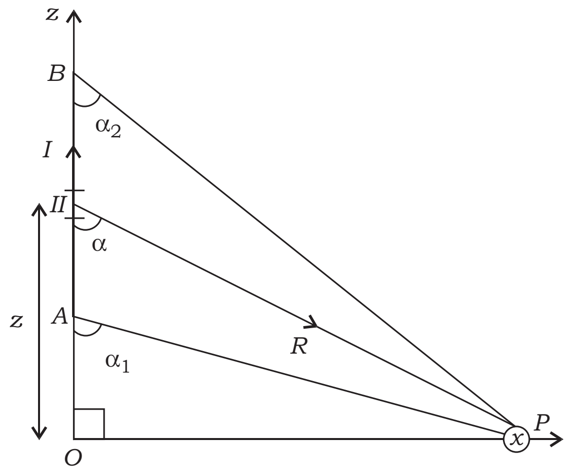


Fig. 2

**5.** *(a)* What is magnetization? Classify magnetic materials.

*(b)* Define and explain magnetic vector potential for three standard current configurations. 5+5

**6.** State and prove Poynting theorem. 10

**7.** *(a)* What is electromotive force? Discuss its different variants.

*(b)* Derive the expression for Maxwell equation in differential form. 5+5





**8.** *(a)* What is polarization? Write the names of different polarizations.

*(b)* A uniform plane wave in a medium having 10 $^{3}$ s/m, 80 $_{0}$ and $_{0}$ is having a frequency of 10 kHz. Calculate different parameters of the wave. 4+6

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