14.08.2019

ST.JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B.Sc. PHYSICS - III SEMESTER
Mid Semester Test – August 2019
PH 318–Electromagnetism, Sound and Physical Optics

Time: 1 hour **Max. Marks: 30**

PART - A

Answer any **three** of the following: **(3 x 6 = 18)**

1. Using Biot-Savart's law, obtain an expression for the magnetic field at a point near a straight conductor of finite length carrying a current.

2. State Gauss's theorem in electrostatics and derive the integral form of the same.

3. Describe Kundt's tube experiment to find the velocity of sound in a metal rod.

4. Deduce an expression for the displacement of the fringes when transparent plate is introduced in the path of one of the interfering beams in a biprism. Hence determine the thickness of the plate.

PART - B

Solve the following: **(2 x 4 = 8)**

5. For a vector $\mathbf{A} = 2x^2y\mathbf{i} + 3yzx\mathbf{j} + x^2y^2z^2\mathbf{k}$, find Curl A at the point (1, -2, 0)

Or

A parallel plate capacitor consist of 2 square metal plates of side 5×10^{-2}m and separated by1cm. Sulphur slab of 6×10^{-3} thickis placed between the plates. Calculate the capacitance of the capacitor. Dielectric constant of Sulphur is 4.

6. In a biprism experiment with a sodium light, bands of width 0.0185 cm are observed at 1m from the slit. On introducing a convex lens 0.3m away from the slit, two images of the slit are seen at 0.7cm apart at one meter distance from the slit. Calculate the wavelength of sodium light.

Or

A brass rod of length 4m is clamped at its centre. It is made to vibrate longitudinally. Find the Young's modulus of brass if the density of brass is 8200 kg/m^3 and the frequency of the note produced is 640 Hertz.

PART C

Answer any **two** of the following: **(2 x 2 = 4)**

7. a) What is the force experienced by a current carrying conductor placed along a magnetic field. Explain

Or

How does the humidity affect velocity of sound?

b) When do we apply Gauss's law?

Or

The centre of Newton's ring pattern in the reflected system is dark. Explain.