

Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore-641 043
Bachelor's Degree Examination – November -2017
III Semester

Class : II UG
Major : Physics

Time :3 hours
Max. Marks: 100

15BPHC07 Electricity and Magnetism
Part-A

10 x 1=10

Choose the correct answer

1. The total flux due to the charge present outside a closed surface is
a. q/ϵ_0 b. $q\epsilon_0$ c. $q^2\epsilon_0$ d. zero
2. The excess pressure inside an electrified soap bubble is given by
a. $2T/r$ b. $2Tr$ c. $4T/r$ d. $4Tr$
3. A capacitor of capacity $50\mu\text{F}$ is charged to 10 volts. Its energy in Joules is _____
a. 2.5×10^{-3} b. 5×10^{-3} c. 5×10^{-4} d. 2.5×10^{-4}
4. In a Dolezalek quadrant electrometer, the quadrants are made of _____
a. copper b. silver c. brass d. aluminium
5. Thermoelectrically negative metals are _____
a. Cd, Sb b. Ag, Zn c. Sn, Au d. Cu, Mn
6. The _____ effect takes place at the junctions only
a. Seebeck b. Peltier c. Thomson d. Joule
7. The magnetic potential at a point due to north pole is given by _____
a. $-m/4\pi\mu x$ b. $m/4\pi\mu x$ c. $-mx/4\pi$ d. $mx/4\pi$
8. The magnetic field inside the shell is _____
a. 1 b. -1 c. 0 d. ∞
9. The susceptibility of a _____ material is negative.
a. dia b. para c. ferro d. antiferro
10. When no magnetic material is present in the core of the Rowland ring the relation between the three magnetic vectors is
a. $B = \mu_0 M$ b. $H = \mu_0 B$ c. $B = \mu_0 H$ d. $B = \mu_0 M$

Part B

5 X 6=30

Answer the following

Answer should not exceed 400 words or two pages

- 11.a. State and Prove Coulomb's law.
(or)
- 11.b. Find an expression for the mechanical force per unit area on the surface of a charged conductor.
- 12.a. Show that there is always a loss of energy when two charged conductors share their charges.
(or)
- 12.b. Obtain the expression for the capacity of spherical condenser when the outer sphere is earthed.
- 13.a. State and Prove Kirchhoff's laws.
(or)
- 13.b. What is Peltier effect? Write the demonstration of peltier effect using S.G. Starling Method.
- 14.a. Discuss about magnetized sphere.
(or)
- b. Discuss in detail about magnetic shell and define its strength.
- 15.a. Write a note on Magnetic permeability.
(or)
- b. Describe a magnetometer method of tracing the hysteresis curve with necessary diagram of a sample of iron in the form of a long thin rod.

5 x 12=60

Part C

Answer the following

Answer should not exceed 800 words or four pages

- 16.a. State and prove Gauss theorem and Apply this theorem to find the electric intensity at a point due to uniformly charged hollow cylinder.
(or)

- b. Discuss briefly about electrical images. Obtain an expression for electric intensity at a point on a plane conducting surface.
- 17.a. Derive an expression for energy stored in a parallel plate condenser. How does this energy change on the introduction of a dielectric slab between the plates?
(or)
- b. Discuss the construction, working and theory of Kelvin's absolute electrometer. Why it is called Absolute electrometer.
18. a. Explain the principle of Potentiometer. Describe the potentiometer method of measuring small thermo emf.
(or)
- b. What is a thermoelectric diagram? Discuss how it is used to determine the Thomson emf, neutral temperature and temperature of inversion.
- 19.a. What do you mean by magnetic dipole?. Determine the magnetic potential and intensity at a point on the axial line due to a dipole.
(or)
- b. Derive an expression for magnetic potential and its relation intensity of a field at an arbitrary point due to a dipole.
- 20.a. Derive the relation between the magnetic vectors B, H and M.
(or)
- b. What is hysteresis? Derive an expression for the energy loss due to hysteresis.
