

**PSG COLLEGE OF ARTS & SCIENCE**  
(AUTONOMOUS)

**BSc DEGREE EXAMINATION DECEMBER 2019**  
(Third Semester)

**Branch-PHYSICS**

**ELECTRICITY AND MAGNETISM**

Time: Three Hours

Maximum: 75 Marks

**SECTION-A (10 Marks)**

Answer **ALL** questions

**ALL** questions carry **EQUAL** marks (10x1 = 10)

- 1 Gauss Law cannot be used to find which of the following quantity?  
(i) Electric field intensity (ii) Electric flux density  
(iii) Electric Charge (iv) Permittivity
- 2 The relation between three electric vectors E,P and D is \_\_\_\_\_  
(i)  $D = E + E_0P$  (ii)  $D = I_0E + P$   
(iii)  $D = \text{---}$  (iv)  $D = \text{---}$
- 3 Kirchoff's Laws are appreciable to, \_\_\_\_\_  
(i) dc only (ii) ac only  
(iii) both ac and dc (iv) EM wave only
- 4 Thevenin's equivalent of a network consists of a \_\_\_\_\_  
(i) Constant current source with a resistance in parallel  
(ii) Constant current source with a resistance in series  
(iii) Constant voltage source with a resistance in parallel  
(iv) Constant voltage source with a resistance in series
- 5 The thermo - emf is measured by \_\_\_\_\_  
(i) Ballistic galvanometer (ii) Potentiometer  
(iii) Tanget galvanometer (iv) Spectrometer
- 6 Which of the following factor does not affect ionic mobility?  
(i) Pressure (ii) Nature of ions  
(iii) Temperature (iv) Concentration of the solution
- 7 The frequency of AC in India is \_\_\_\_\_  
(i) 60 Hz (ii) 50 Hz  
(iii) 220Hz (iv) 250Hz
- 8 What is the effective value of current?  
(i) Total current (ii) Average current  
(iii) RMS current (iv) Instantaneous current
- 9 The magnetic susceptibility of a Paramagnetic material is \_\_\_\_\_  
(i) Small and negative (ii) Small and positive  
(iii) Large and positive (iv) Large and negative
- 10 The relation between electric field and magnetic field is governed by physical Laws, which are known as  
(i) Kirchoff's Law (ii) Ampere's Law  
(iii) Gauss Law (iv) Maxwell's Law

**SECTION - B (35 Marks)**Answer **ALL** Questions**ALL** Questions Carry **EQUAL** Marks

(5 x 7 = 35)

11 a State and prove Gauss Law.

OR

b Bring out poisson's equation in electrostatics from Gauss's Law. What form it does it take when the charge density is zero?

12 a A copper wire of diameter 0.5 mm and length 20 m is connected across a battery of emf 1.5 V and internal resistance 1.2571. Calculate current density in the wire and the drift velocity  $V_d$  assuming one conduction electron per atom of copper. Density of cu- 9000kg/m<sup>3</sup>; Atomic weight of cu - 64 gm/mole.

OR

b State and prove Norton's theorem.

13 a What is Faraday's Laws of electrolysis and explain how these laws lead to the idea of the atomic nature of electricity.

OR

b Describe a method of measuring the thermo e.m.f using potentiometer.

14 a Discuss the LCR parallel resonance circuit.

OR

b A step - up transformer operates on a 220 v line and supplies a current of 2A. The ratio of primary and secondary windings is 1:25. Determine the secondary voltage, primary current and power output. Assume 100 % efficiency.

15 a Compare the Dia, Para and Ferro magnetic materials.

OR

b Outline the Maxwell's equations and give its significance.

**SECTION - C (30 Marks)**Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks

(3 x 10 = 30)

16 Analyze Gauss's Law to find the electric field due to charged conducting sphere.

17 Discuss in detail electrical conductivity of a metal using Drude - Lorentz theory.

18 Outline the thermodynamics to a thermocouple to derive the expressions for Peltier and Thomson coefficients.

19 Analyse the growth and decay of current in a circuit containing a resistance and inductance.

20 Discuss in detail Langevin's theory diamagnetism.

Z-Z-Z

END