

UG Part-II Practical Examination, 2020
Physics (Hons.), Paper- VI1

Time: 6 hrs.

F. M: 50

Answer any FIVE questions

$5 \times 10 = 50$

1. Find Poisson's equation in electrostatics. What is Laplace's equation ? What are their importances in electrostatics? Define the capacitance of a capacitor. Find the Capacitance of a cylindrical capacitor of internal and external radii a and b respectively, and of length l . 2+1+2+1+4=10

2. A point charge q is placed at a distance r_0 from the centre of a grounded spherical conductor of radius a ($r_0 > a$). Assuming the solution of Laplace's equation, find

- a) potential at an external point.
- b) total charge induced on the sphere.
- c) identify the electrical image.

4+3+3=10

3. State and explain Biot-Savart's law. Using this law calculate the magnetic field at any point on the axis of a solenoid of finite length. What is drift velocity? Find an expression connecting current (I) and current density (\vec{J}). 2+4+1+3=10

4. Derive the relation of critical temperature, pressure and volume of a gas with the constants of Van der Wall's equation of state for real gas. What do you mean by Boyle temperature for a real gas? Obtain its value from Van der Wall's equation of state. 5+2+3=10

5. State first law of thermodynamics. Starting from this law, derive the relation between pressure and volume of an ideal gas in an adiabatic process. Distinguish between reversal and irreversible processes. 2+5+3=10

6. What is meant by a Carnot cycle? Show it on

- a) P-V diagram and a
- b) T-S diagram.

Obtain an expression for the efficiency of a Carnot engine.

2+2+2+4=10

End