

B.Sc. Semester - 4 (CBCS) Examination

March/April-2023 [NEW COURSE]

Physics-Ph401(Core)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Q.1(A) Answer the following questions. (Any Two) (10)**
1. Explain motion of a charged particle in a uniform magnetic field.
 2. Explain Biot-Savart law.
 3. Discuss vector potential.
- Q.1(B) Answer the following question. (Any One) (04)**
1. Derive the formula of magnetic field due to a current carrying straight wire using Biot-Savart law.
 2. Derive an expression for magnetic field inside a current carrying long solenoid using Ampere's law.
- Q.2(A) Answer the following questions. (Any Two) (10)**
1. Explain specific heat of the gas.
 2. Derive Mayer's formula.
 3. Derive an expression for work done during an adiabatic process.
- Q.2(B) Answer the following question. (Any One) (04)**
1. Write a note on Carnot's ideal heat engine.
 2. Discuss second law of thermodynamics.
- Q.3(A) Answer the following questions. (Any Two) (10)**
1. Write a note on T-S diagram.
 2. Explain change of entropy in reversible process.
 3. Explain Stefan - Boltzmann law.
- Q.3(B) Answer the following question. (Any One) (04)**
1. Assuming sun as a black body and its surface temperature is 5727°C . Calculate the heat radiates from the sun's surface. ($\sigma = 5.67 \times 10^{-8} \text{ W/m}^2\text{K}^4$)
 2. A heat engine operates between a cold reservoir at temperature $T_2 = 300\text{K}$ and a hot reservoir at temperature T_1 . It takes 200J of heat from the hot reservoir and delivers 120J of heat to the cold reservoir in a cycle. What could be the minimum temperature of the hot reservoir?
- Q.4(A) Answer the following questions. (Any Two) (10)**
1. Explain principle, construction, working and characteristics of Photodiode.
 2. Explain construction, working and applications of varactor diode.
 3. Draw the equivalent circuit of UJT and discuss its working.
- Q.4(B) Answer the following question. (Any One) (04)**
1. Explain output characteristic of JFET.
 2. Write a note on multicolour LED.
- Q.5(A) Answer the following questions. (Any Two) (10)**
1. Explain Exclusive OR gate.
 2. Explain three basic logic gates.
 3. Discuss NAND gate as a universal gate.
- Q.5(B) Answer the following question. (Any One) (04)**
1. State and prove De Morgan's theorems.
 2. Discuss advantages and disadvantages of digital electronics.
