647510 **BFS4PhyC401x** **Seat No :_____**

B.Sc.(FS) Semester - 4 (*CBCS*) Examination
March/April-2023 [NEW COURSE]
Physics(Core)

Time: 2:30 Hours **Marks: 70**

Instructions:

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

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. ($\sigma = 5.67 \times 10^{-8}$ W/m^{2}K^4)
2. A heat engine operates between a cold reservoir at temperature $T_2 = 300$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.

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