K24U 1629

Reg. No.: .....

Name : .....

Second Semester B.Sc. Degree (CBCSS – OBE-Regular/Supplementary/ Improvement) Examination, April 2024
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN PHYSICS
2C02PHY : Electricity, Magnetism and Thermodynamics

Time : 3 Hours Max. Marks : 32

PART – A

Short answer questions. Answer **all** questions. **Each** question carries **1** mark.

1. What is diamagnetism ? Give two examples.
2. State first law of thermodynamics.
3. Write down the expression for magnetic induction at a point due to a straight current carrying conductor. Give its unit.
4. What is Lorentz force ? Write down Lorentz force formula for a charged particle.
5. Define thermodynamic equilibrium. **(5×1=5)**

PART – B

Short essay questions. Answer **any 4** questions. **Each** question carries **2** marks.

6. Write a note on ferromagnetism.
7. Briefly explain a Carnot's engine.
8. How is a potentiometer used to calibrate an ammeter ?
9. What is a thermodynamic system ? Give an example.
10. State Biot-Savart Law.
11. What is the working principle of a moving coil ballistic galvanometer ? **(4×2=8)**

P.T.O.

PART – C

Problems. Answer **any 3** questions. **Each** question carries **3** marks.

12. A Carnot engine is working between 300°C and 1000°C. Calculate the increase in efficiency if temperature of the source is raised by 200°C.

13. An iron rod of volume 10^{-3} m^3 and relative permeability 1000 is placed as the core in a solenoid with 10 turns per cm. Let a current of 0.5 A is passed through the solenoid. Calculate the magnetic moment of the rod.

14. A Carnot engine working between 300 K and 600 K has a work output of 800 J per cycle. What is the amount of heat energy supplied to the engine from source per cycle ?

15. If 8 A of current flows in the first wire, 11 A of current flows in the second wire. The distance between the two wires is 15 m. Find the magnetic force between the two wires.

16. One mole of oxygen gas expands isothermally to four times its initial volume. Calculate the increase in entropy. Given R = 8.314 J $mol^{-1}K^{-1}$. **(3×3=9)**

PART – D

Long essay questions. Answer **any 2** questions. **Each** question carries **5** marks.

17. Obtain an expression for magnetic induction at a point on the axis of a circular coil.

18. What is a Carey Foster bridge ? How is it used to determine the resistance ?

19. Explain the features of adiabatic process. Obtain the expression for work done during an adiabatic change.

20. Compare diamagnetism, paramagnetism and ferromagnetism with examples. **(2×5=10)**

———————

K23U 2002

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN PHYSICS
2C02PHY : Electricity, Magnetism and Thermodynamics

Time : 3 Hours Max. Marks : 32

PART – A

Short Answer questions. Answer **all** questions. **Each** question carries **1** mark.

1. What is magnetic induction ?
2. State and explain Biot-Savart's Law.
3. What is Ferrimagnetism ? Give two examples.
4. State zeroth law of thermodynamics.
5. Define the coefficient of performance of a refrigerator. **(5×1=5)**

PART – B

Short Essay questions. Answer **any 4** questions. **Each** question carries **2** marks.

6. Derive the expression for the force on a current-carrying conductor in a magnetic field.
7. Prove that the entropy of a system increases in an irreversible process.
8. Obtain the relation between adiabatic and isothermal elasticity.
9. Obtain an expression for torque on a current loop in a uniform magnetic field.
10. How an unknown resistance is determined using Carey-Foster's bridge ?
11. Write a short note on diamagnetism and paramagnetism. **(4×2=8)**

P.T.O.

PART – C

Problems. Answer **any 3** questions. **Each** question carries **3** marks.

12. Calculate the change in the entropy when 5 kg of water at 100 degree celsius is converted to steam at the same temperature (Latent heat of steam = 540 cal/g).

13. Two long parallel wires separated by 3 cm in air, carries a current of 100A. Find the force on the 1 m length of the wire.

14. The efficiency of an ideal engine is 0.2. If the temperature of the sink is lowered by 20°C, the efficiency becomes 0.25. Find the temperature of the source and sink.

15. One mole of helium at 27°C is compressed adiabatically so that pressure becomes 32 times its initial value. Find the final temperature and work done.

16. An iron rod 0.2 cm long, 10 mm in diameter and of relative permeability of 1000 is placed inside a long solenoid wound with 300 turns/m. If a current of 0.5 A is passed through the rod. Find the magnetic moment **(3×3=9)**

PART – D

Long essay questions. Answer **any 2** questions. **Each** question carries **5** marks.

17. Describe Carnot's cycle and obtain an expression for the efficiency of an ideal heat engine.

18. Discuss the theory and working principle of moving coil ballistic Galvanometer.

19. Discuss magnetic susceptibility and magnetic permeability. Obtain the relation between magnetic vectors – B, H & M.

20. With a suitable figure, explain the working principle of the potentiometer.

    Discuss how it is used for the calibration of low and high range voltmeter.

(2×5=10)

———————