U236

Reg. No..... Name: .....

BSC DEGREE END SEMESTER EXAMINATION APRIL 2015

SEMESTER **- 2: PHYSICS (COMPLEMENTARY) FOR MATHEMATICS**

COURSE**: U2CPPHY3 - ELECTRIC AND MAGNETIC PHENOMENA, THERMODYNAMICS AND SPECIAL THEORY OF RELATIVITY**

Time 3 Hours Total: 60 Marks

PART A

[Very short answer questions]

(Answer all questions. Each question carries 1 Mark)

1. What are reversible changes? Give An Example.
2. State the first law of Thermodynamics?
3. What is a heat engine?
4. What do you mean by an inertial frame?
5. Define the terms ‘proper length’ and proper time.
6. Explain what is magnetic susceptibility?
7. What is meant by Curie temperature?
8. Name three paramagnetic substances.

PART B

[Short answer questions]

(Answer any **six** questions. Each question carries 2 Marks)

9. Derive the work done during an adiabatic process.
10. What are polar and nonpolar dielectrics?
11. Why is susceptibility of diamagnetic substances negative?
12. Give the properties of para,dia and ferromagnetic materials, giving examples for each.
13. Explain diamagnetism on the fans of electron theory.
14. Explain what is meant by space time frame of reference.
15. Explain the concept of simultaneity in relativity.
16. Explain the temperature –Entropy diagram.

PART C

[Problems/Derivations]

(Answer any **four** questions. Each question carries 5 Marks)

17. Show that the entropy of the working substance in a Carnots engine is zero during one cycle.
18. Deduce an expression for time dilation on the basis of Lorentz transformation equations.
19. What should be the speed of the body so that its mass is three times its rest mass?
20. Derive relation connecting the displacement vector, polarization vector and the electric field in a dielectric.
21. Find the efficiency of the Carnots engine working between the 127^{o} C and the27^{o} C.
22. A Spaceship moving away from the earth with velocity 0.5 c fires a rocket whose relative velocity to the spaceship is 0.5c away from the earth. Calculate the velocity of the rocket observed from earth.

PART D

(Answer any **two** questions. Each question carries 10 Marks)

23. State the fundamental postulates of the special theory of relativity. Deduce the Lorentz transformation equations.
24. Describe the diesel engine and derive the expression for its efficiency.
25. Deduce the Maxwells thermodynamic relations and mention any two of its applications.
26. Obtain the expression for a parallel plate condenser having a dielectric medium between the plates.

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