M 8743

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (CCSS-Supple./Improv.) Examination, May 2015
(2013 and Earlier Admn.)
COMPLEMENTARY COURSE IN PHYSICS
2C02 PHY : Electricity, Magnetism and Thermal Physics

Time : 3 Hours Weightage : 30

SECTION – A

(Choose the correct answer, **each** bunch carries a weightage of **1**)

1. i) The principle of a moving coil galvanometer is

a) $i\alpha\theta$ b) $i\alpha\theta^2$ c) $i\alpha\frac{1}{\theta}$ d) $i\alpha\frac{1}{\theta^2}$

ii) Iron is an example of _____ material.

a) Paramagnetic b) Ferromagnetic
c) Diamagnetic d) Ductile

iii) The resistance offered by an a.c. circuit containing inductor only is

a) $X_C = \frac{1}{CW}$ b) $X_L = LW$ c) $R = \frac{V}{I}$ d) $Z = X_L - X_C$

iv) _____ is a measure of degree of hotness of a body.

a) Entropy b) Enthalpy
c) Temperature d) Pressure

2. i) Mean valve of a.c. over a half cycle is

a) $\frac{i_0}{\pi}$ b) $\frac{2i_0}{\pi}$ c) $\frac{i_0}{2\pi}$ d) $\frac{i_0\pi}{2}$

ii) Dimension of CR is

a) $M^\circ L^\circ T$ b) $M^\circ L^\circ T^{-1}$ c) $ML^{-1}T^{-2}$ d) MLT^{-1}

P.T.O.

iii) A process in which volume remains constant

a) isobaric b) isothermal c) adiabatic d) isochoric

iv) Refrigerator works on _____ law of thermodynamics.

a) First b) Second

c) Third d) Carnot's theorem **(2×1=2)**

SECTION – B

(Answer **any six** questions. **Each** question carries a weightage of **1**)

3. Distinguish between a B.G. and dead-beat galvanometer.
4. What is the theory of a potentiometer ?
5. Define time constant of an LR circuit.
6. What is the relation between the three magnetic vectors $\vec{B}$, $\vec{H}$ and $\vec{M}$? How the relation changes of no magnetic material is present inside the core of Rowland ring ?
7. What is an isothermal process ? Give the equation for such a process.
8. Explain any 2 application of first law of thermodynamics.
9. What is Clausius inequality ?
10. State 2nd law of thermodynamics. **(6×1=6)**

SECTION – C

(Answer **any nine** questions. **Each** question carries a weightage of **2**)

11. A potentiometer wire of length 10m and resistance 20Ω is connected in series with a 15 V battery and as external resistance 40Ω. A secondary cell of emf E in the secondary circuit is balanced by 240 cm long potentiometer wire. What is the emf of the secondary cell ?
12. In an oscillatory circuit L = 0.2 H and C = 0.0012μ F. What is the maximum value of the resistance for the circuit to be oscillatory ?
13. An iron rod 0.2 m long, 10 mm is diameter and relative permeability 1000 is placed inside a long solenoid wound with 300 turns/metre. If a current of 0.5 A is passed through the solenoid, find the magnetic moment of the rod.

14. Show that $B = \mu_0 (H + M)$ and $\mu = \mu_0 (1 + \chi_m)$.
15. Calculate the change in entropy when 1 Kg of ice melts at 0°C. (Specific latent heat of fusion of ice = 3.36×10^5 JKg^{-1}).
16. Show that entropy of a system increases in an irreversible process.
17. A Carnot's engine whose temperature of the source is 400 K takes 2000 J of heat at this temperature and rejects 1600 J of heat to the sink. What is the temperature of the sink ? Calculate the efficiency of the engine.
18. Derive an expression for workdone in an isothermal change.
19. One mole of a gas at 27°C expands adiabatically until its volume is doubled. Calculate the workdone ($\gamma = 1.4$).
20. From T-S diagram, derive the efficiency of a Carnot Engine.
21. A 10A ammeter has a resistance of 0.09Ω. What resistance of the shunt will enable it to read upto 100 A ?
22. A paramagnetic substance of susceptibility 3×10^{-4} is placed in a magnetic field of 4×10^{-4} Am^{-1}. Find the intensity of magnetization. **(9×2=18)**

SECTION – D

(Answer **any one** question. **Each** question carries a weightage of **4**)

23. Discuss the construction, theory and working of a moving coil Ballistic Galvanometer.
24. Draw the Carnot's cycle of a Carnot engine and derive an expression for its efficiency. **(1×4=4)**

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