



M 6583

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.)  
Examination, May 2014  
COMPLEMENTARY COURSE IN PHYSICS  
2C02 PHY : Electricity, Magnetism and Thermal Physics

Time: 3 Hours

Total Weightage : 30

SECTION – A

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

1. i) Quality factor of an CR circuit is  
a)  $1/\omega CR$       b)  $\omega R/C$       c)  $\omega/CR$       d)  $\omega C/R$
  - ii) To convert a galvanometer into an ammeter  
a) Connect a high resistance in parallel  
b) Connect a low resistance in parallel  
c) Connect a high resistance in series  
d) Connect a low resistance in series
  - iii) Root mean square value of alternating voltage is  
a)  $E_0/\sqrt{2}$       b)  $E_0 \sqrt{2}$       c) zero      d)  $E_0/2$
  - iv) Platinum is an example of  
a) ferromagnetic      b) antiferromagnetic  
c) ferrimagnetic      d) paramagnetic
2. i) Zeroth law of thermodynamics is  
a) kinetic energy of molecules of a gas is zero  
b) ideal gas does not contain molecules  
c) if two systems are separately in thermal equilibrium with a third system then they themselves are in thermal equilibrium with each other  
d) absolute zero temperature cannot be attained





- ii) Internal energy of a real gas depends upon
- Only on the temperature of the gas
  - Only on the volume of the gas
  - Only on the pressure of the gas
  - Size of the molecule
- iii) Choose the correct statement
- all quasi-static processes are reversible
  - all reversible processes are quasi-static
  - adiabatic process is quasi-static
  - none of these
- iv) The change in entropy of a mole of an ideal gas, when the gas undergoes free expansion is
- a) positive      b) zero      c) negative      d) none of these

(2×1=2)

### SECTION – B

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

- Why is series LCR circuit called acceptor circuit ?
- Give the principle of potentiometer.
- Define magnetic permeability of a medium.
- Distinguish between antiferromagnetism and ferrimagnetism.
- Give the principle of ac induction motor.
- “Entropy of the universe tends to a maximum”. Explain the statement.
- State the third law of thermodynamics.
- Give the Kelvin-Planck statement of second law of thermodynamics.

(6×1=6)





SECTION - C

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

11. In an experiment with Carey Foster bridge, the shift in the balance point is 5.4 cm when a thick copper strip and one ohm resistance are interchanged. The one ohm resistance is then replaced by an unknown resistance. Now the balance point shifts by 10 cm on interchanging. Calculate the unknown resistance.
12. A capacitor of capacitance  $1 \mu\text{F}$  is discharged through a high resistance. The time taken for half the charge on the capacitor to leak is found to be 10s. Calculate the value of the high resistance.
13. Derive Helmholtz equation for growth of current in an L-R circuit.
14. Derive an equation for the resonant frequency of an ac circuit with inductance and capacitor in series.
15. A choke of 0.5 H, a capacitance of  $15 \mu\text{F}$  and a resistance of 100 are connected in series across 200 V 50 Hz main. Find
  - i) current in the circuit and
  - ii) power factor of the circuit.
16. Show that adiabatic elasticity is  $\gamma$  times isothermal elasticity.
17. A motor tyre has a pressure of two atmospheres at the room temperature of  $27^\circ\text{C}$ . If the tyre suddenly bursts, find the resulting temperature ( $\gamma = 14$ ).
18. A magnetic induction of  $2 \times 10^{-4} \text{Wbm}^{-2}$  in vacuum produces a magnetic flux of  $2.4 \times 10^{-8} \text{Wb}$  in a bar of area of cross section  $2 \times 10^{-5} \text{m}^2$ . Calculate the intensity of magnetization.
19. Distinguish between dia, para and ferromagnetic materials.
20. One kilogram of water at  $0^\circ\text{C}$  is heated to  $100^\circ\text{C}$ . Compute the change in entropy (specific heat capacity of water =  $4200 \text{Jkg}^{-1}\text{K}^{-1}$ ).





21. Show that there is always a change in entropy in an irreversible cycle.
22. A Carnot engine whose low temperature reservoir is at  $7^{\circ}\text{C}$  has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees should the temperature of the high temperature reservoir be increased? **(9×2=18)**

## SECTION – D

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

23. Describe the working of a Carnot's Engine. Derive an expression for its efficiency.
24. Give the construction of a moving coil galvanometer. Derive an expression between the quantity of charge flowing through it and throw obtained. Show how to correct the observed throw for damping. **(1×4=4)**
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