PHY (GERNAL RAJ)

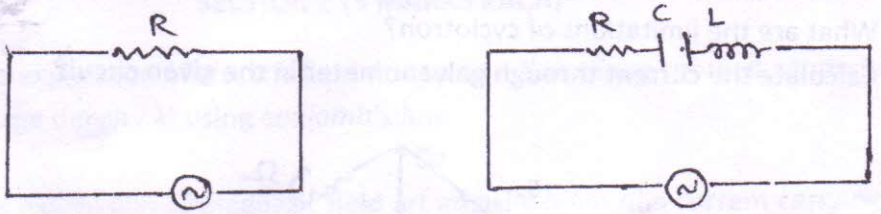
C 12

FIRST TERM EXAMINATION-2015 - 2016

M.M.:70

SECTION A (1 MARK EACH)

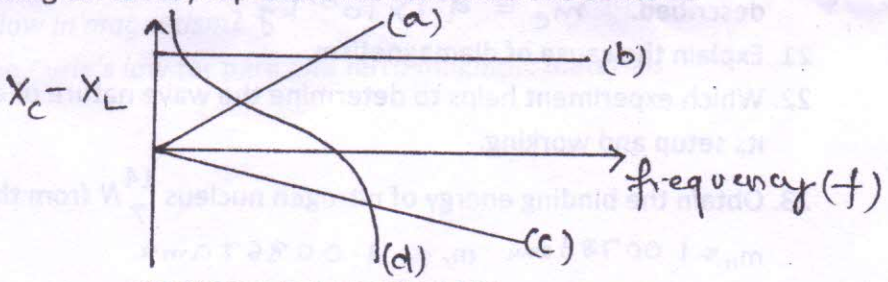
1. Electric dipole moment of $CuSo_4$ molecule is 3.2×10^{-32} Cm. Find the separation between Cu and So_4 ions.
2. Sketch a graph showing variation of resistivity with temperature of (i) copper (ii) silicon
3. Study the circuits (a) and (b) shown in the figure and answer the following questions



(i) Under which conditions would the rms current in the two circuits be the same?

(ii) Can the rms current in circuit (b) be larger than (a)?

4. State *Ampere circuital law.*
5. What is the difference between the susceptibility of a paramagnetic and a diamagnetic substance?
6. What is mass defect? What is its relation with binding energy?
7. Explain how *lenz's law* is in accordance with conservation of energy law.
8. Which of the following curve may represent the reactance of a series LC combination?



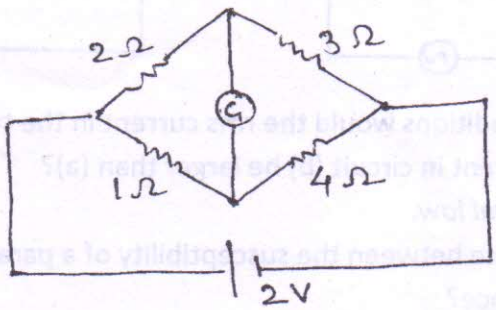
SECTION B (2 MARKS EACH)

9. If the horizontal component, at a place where angle of dip is 30°, is 2×10^{-4} gauss find the Earth's Magnetic field intensity at that point.
10. What is the work done in rotating an electric dipole from an unstable equilibrium to stable equilibrium?
11. Convert a 20Ω galvanometer into an ammeter to measure a current of 5amp. The current of maximum deflection in galvanometer is 10mA.
12. State *Gauss's theorem*. Find the potential difference between the plates of a parallel plate capacitor having surface density of charge $5\times10^{-8}Cm^{-2}$ with the separation between plates being 4mm.
13. Give reasons for the following facts
    (a) The magnetic blocks are made curved in galvanometer
    (b) The cylindrical core is made of soft iron and not of stainless steel.

14. A photon beam of 6eV is incident on two photo sensitive surface having work function 2eV and 3.5eV. Find the ratio of the maximum kinetic energy of electrons ejected from the two surfaces.
15. What is distance of closest approach? Derive it's mathematically expression.
16. Derive an expression of emf induced across the ends of the rod of iron when rotated in a uniform perpendicular magnetic field. Given that the length of the rod is 'l', magnetic field strength 'B', and frequency of rotation is 'f'.

SECTION C (3 MARKS EACH)

17. Find the effect of inserting a dielectric slab of thickness't' in a parallel plate capacitor of dielectric 'k' on its capacitance. What happens if the slab is metallic?
18. What are the limitations of cyclotron?
19. Calculate the current through galvanometer in the given circuit.



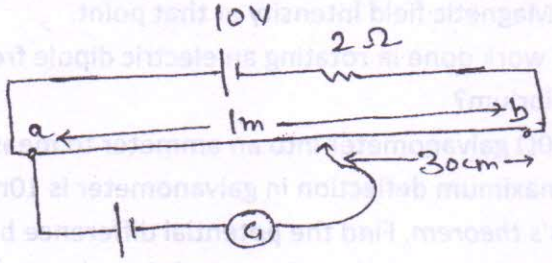
$(G = 5\Omega)$

20. An electron, after being accelerated through a potential difference of 100V, enters a uniform magnetic field of 0.004T perpendicularly. Calculate the radius of the path described. $m_e = 9.1 \times 10^{-31}$ kg
21. Explain the cause of diamagnetism.
22. Which experiment helps to determine the wave nature of electron? Briefly explain its setup and working.
23. Obtain the binding energy of nitrogen nucleus ${}^{14}_{7}N$ from the following data

    $m_H = 1.00783$ amu $m_n = 1.00867$ amu

    $m_N = 14.00307$ amu give you answer in MeV
24. Using the potentiometer setup given in the figure find the emf of the unknown cell 'E'

    $R_{ab} = 48\Omega$



25. When two current carrying wires are kept parallel to eachother, calculate the force per unit length experienced by them. Based on the result obtained, define one ampere.

SECTION D (4 MARKS)

26. Being a medical/engineering aspirant you are expected to have a sound knowledge of physics. Why you think it is a compulsory subject? If a child asks his father, how an invisible current can be converted into mechanical torque to rotate a fan, what should be the logical explanation to his question?

SECTION E (5 MARKS EACH)

27. Derive the expression of electric field due to an infinite long charged conductor(linear charge density λ) using *coulomb's law*

    Or

    Derive the expression of magnetic field art an axial point of a current carrying coil of 'N' turns

28. Explain the construction, working, and working principle of MCG.

    Or

    Explain the construction, working principle and working of AC transformer. Also specify the losses in it.

29. (a)State law of radioactive disintegration
    (b)What is 'impact parameter?
    (c)Give the mathematical expression for quality factor for an RLC circuit.
    (d)What is *Gauss law in magnetism*?
    (e)State and define *Curie's law* for para and ferro magnetic materials.