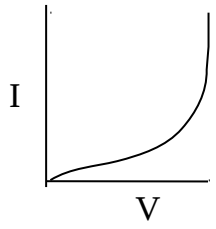
HSE EXAMINATION MARCH 2012
PHYSICS

HSE II Max.Marks : 60

Time : 2. hrs
Cool off time :15 miutes

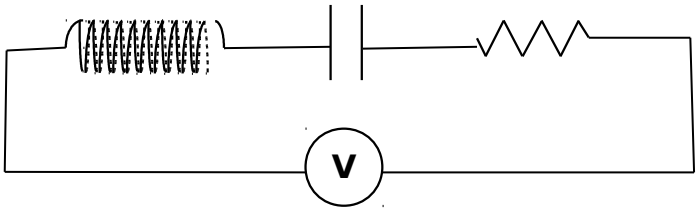
1. a) Define Electric Flux? Name and state the law which relates electric flux and charge? (2½)
   b) A sphere of radius 'R' carries a charge +Q. Find the electrified at a point
   1) r<R, 2) r=R 3) r>R (3)
2. A capacitor is an arrangement for storing charges. On what factors does the capacitance of a parallel plate capacitor depends on? (2)
3. a) I - V graph of certain electronic device is shown. Does it obey ohms law? (1)



   b) State ohms law? what are it's limitations? (2)
4. a) Potentiometer is a better device for measuring potential difference than Volt meter. Comment? (1)
   b) What is principle of Potentiometer? (2)
5. a) Name the force experienced by a moving charge in a magnetic field? Give expression for for it? (2)
   b) Cyclotron is used to accelerate charged particles. Explain it's working and write down expression for it's frequency? (3)
6. Which e - m radiation in e - m spectrum is mainly involved in
   a) Green house effect
   b) Distant Photography during foggy condition
   c) Radar
   d) Attenuation studies (2)
7. A convex lens in air shows a different focal length when placed in water
   1) Derive a relation connecting focal length of lens and refractive index (3)
   2) How does this relation change for a concave lens (1)
8. Compound microscope magnifies better than a simple microscope
   a) Compare the magnification of a compound microscope and a simple microscope (2)
9. In young's double slit experiment alternate bright and dark bands are formed due to interference
   a) How is bandwidth altered when distance between screen & slits, seperation between slits are both doubled. (2)

b) What happens with the bandwidth if the experimental arrangement is immersed in water.

10. If I is the instantaneous value of current in the circuit shown
(i) what are instantaneous values of voltage across each components L,C & R (2)

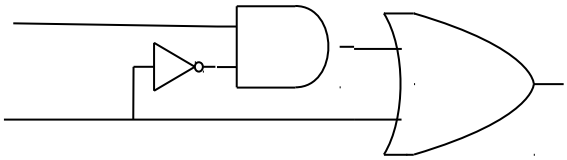


ii) What is impedance of circuit (1)
iii) Explain the phenomenon resonance (1½)

11. What is eddy current. How is it minimized. (2)

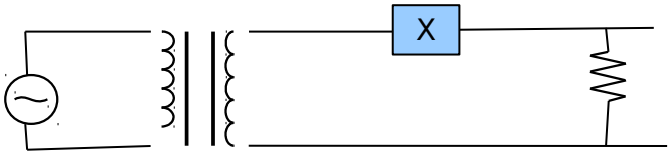
12. Soft iron is preffered over steel in making transformer cores
a) Explain coercivity and retentivity (2)
b) Draw the hysterisis curve of steel and soft iron (1)

13.



a) Identify the gates used in the above circuit. (1)
b) Write the truth table of the given logic circuit (1)

14.



a) Identify X and the given circuit (2)
b) Draw the output wave form (1)
c) Give the characteristic curve for the above element X (2)

15. Communication is the process of transmitting information from one place to another, Then
a) What are the essential elements of a communication system (1)
b) Why modulation is needed to transmit signals over long distance (2)

16. Photo electric effect is the emission of electrons from a metallic surface when suitable light incident on it.
a) What are the essential conditions for this emission (1)
b) How photo electric current is affected by frequency of light and potential (3)

17. If the wave length λ of special lines emitted by hydrogen atom is generally expressed as $1/\lambda = R[1/n_1^2-1/n_2^2]$ where R is the Rydberg constant and n_1 and n_2 are constants.

a) Write down the expression for Balmer series of spectral lines. (1)

b) Find out the shortest wavelength of spectral line emitted in Balmer series? (2)

18. a) Obtain an expression for mass defect in nuclear reaction (1)

b) If No and Nt are the no. of nuclei present initially and at a later time ‘t’ of the radioactive sample, then obtain the relation between them (2)