

KENDRIYA VIDYALAYA SANGATHAN, CHENNAI REGION

Class- XII -COMMON PRE - BOARD EXAMINATION-1 (2016 -17)

SUBJECT : PHYSICS

Time allotted :3 hours

Max Marks: 70

GENERAL INSTRUCTIONS:

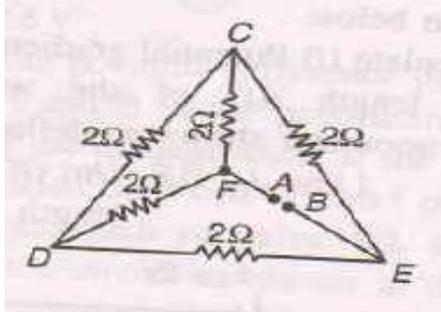
1. All questions are compulsory.
2. There are 26 questions in total. Questions 1 to 5 carry one mark each, questions 6 to 10 carry two marks each, questions 11 to 22 carry three marks each, question 23 is value based one carries 4 marks and question 24 to 26 carry 5 marks each.
3. There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each.
4. Use of calculators is not permitted.
5. You may use log table wherever necessary.

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1. At what angle of incidence should a beam of light strike a glass slab of refractive index  $\sqrt{3}$ , such that the reflected and refracted rays are perpendicular to each other?
  2. A glass rod rubbed with silk acquires a charge of  $1.6 \times 10^{-12} \text{C}$ . What is the charge on silk?
  3. What is the velocity of a charged particle moving in between the equal electric and magnetic fields applied in opposite directions?
  4. Name the physical quantity which is measured in weber/A
  5. If the length of a cylindrical metallic conductor is doubled, how does the resistivity of conductor change?
  6. If the output of OR gate is given as an input of NOT gate. Name the gate so formed. Write the logic symbol and the truth table of this gate.
  7. Draw a neat and labeled diagram to show the image formation in a compound microscope. Write the expression for magnifying power, when final image is formed at near point.
  8. The magnetic flux through a coil perpendicular to its plane and directed into paper is varying according to the relation  $\Phi = 5t^2 + 10t + 5$  milli weber. Calculate the e.m.f induced in the loop at  $t = 5$  sec.

OR

- A galvanometer coil has a resistance of  $12 \Omega$  and It shows full scale deflection for a current of 3 mA. How will you convert the galvanometer into voltmeter of range 0 to 18 volt?
9. Name the device which is used to transform a.c. supply from one level of voltage to another. State the principle based on which it works.
  10. A radioactive isotope has a half-life of T years. How long will it take for the activity to reduce to 3.125 % of its initial value.
  11. A potential of  $E = 50 \sin (200 \pi t + \pi/4)$  is applied across a resistor of  $10 \Omega$  resistance. Find 1. rms voltage. 2. Frequency of a.c 3. rms value of current.

12. Show by a ray diagram, the image formation of a point object by a thin double convex lens having radii of curvature  $R_1$  and  $R_2$ . Hence derive the relation  $1/f = (\mu - 1) (1/R_1 - 1/R_2)$  where 'f' is the focal length and ' $\mu$ ' is the refractive index of material of the lens with respect to air.
13. A potential difference of 2 V is applied between the points A and B shown in network drawn below.



Calculate the equivalent resistance of the network between the points A and B and the magnitudes of currents flowing in the arms AFCEB and AFDEB.

14. Define the term 'drift velocity' of electrons in a conductor. Give its SI unit. Show that the resistance of a conductor is given by  $R = m l / ne^2 A \tau$  using the concept of drift velocity.
15. a) What are coherent sources? Can two individual monochromatic source of light behave as coherent sources?
- b) What is the effect on the fringe width observed in a young's double slit experiment, when
1. Screen is moved away from the plane of the slits.
  2. Separation between the slits is increased.
  3. whole apparatus is immersed in water.
16. A proton and a deuteron are accelerated through the same accelerating potential. Which one of the two has (a) greater value of de-Broglie wavelength associated with it, and (b) less momentum?
17. Explain how an audio signal is extracted from the modulating wave with a neat diagram. What is demodulation?

OR

Define i) carrier signal ii) amplitude modulated signal iii) attenuation

18. Name the term that is found missing in ampere's circuital law according to Maxwell. Derive the expression for the same and hence write the modified form of ampere's circuital law.
19. Define "half-life period" of a radioactive element. Derive the relation  $T_{1/2} = 0.693 / \lambda$ . where  $\lambda$  is decay constant.
20. a) In case of a photosensitive surface, state the role of threshold wavelength of incident photon for photo electric effect.
- b) Plot a graph showing the variation of photo current vs collector potential for three different intensities  $I_1 > I_2 > I_3$  and having same threshold frequency for a given metallic cathode.
- c) Write the Einstein's photo electric equation.
21. Distinguish between dia, para and ferro magnetic materials (any three points for each)

22. State 'Bohr's angular momentum quantization condition'. Derive an expression for the radius of  $n^{\text{th}}$  orbit of an electron revolving around the nucleus of a hydrogen atom.

23. Yogesh was using a galvanometer in the practical class. Unfortunately it fell from his hand and broke. His friend's advised him not to tell the teacher. He was upset. But he decided to tell the teacher. Teacher listened to him patiently on knowing that the act was not intentional, but just an accident, and used the opportunity to show the internal structure of galvanometer to the whole class.

(i) What are the values displayed by yogesh.

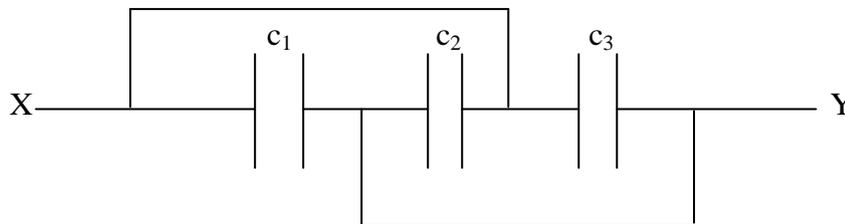
(ii) Explain the principle based on which moving coil galvanometer works.

(iii) What is the significance of figure of merit of moving coil galvanometer?

24. a) A parallel plate capacitor is charged to a potential difference 'V' by a d.c. source. The capacitor is then disconnected from the source. If the distance between the plates is doubled, state with reason how the following will change?

1. electric field between the plates.
2. capacitance
3. energy stored in the capacitor.

b) Three capacitors are connected as shown in figure given below. Calculate the equivalent capacitance between the points X and Y. ( Given that  $C_1 = C_2 = C_3 = 2\mu\text{F}$ .)



OR

- a) State Gauss's law in electrostatics. Using this theorem, show mathematically that for any point outside the shell, the field due to uniformly charged thin spherical shell is the same as if entire charge of the shell is concentrated at the Centre. Why do you expect the electric field inside the shell is zero according to this theorem?
- b) How does the electric flux change, when area enclosed by the charge is doubled?

25. a) A concave lens made of material of refractive index ' $n_2$ ' is kept in a reference medium of refractive index ' $n_1$ '. Trace the path of parallel beam of light passing through the lens when

1.  $n_1 = n_2$
2.  $n_1 < n_2$
3.  $n_1 > n_2$

b) The far point of a myopic person is 80 cm in front of the eye. What is the focal power of the lens required to enable him to see very distant objects clearly?

OR

- a) Deduce Snell's law of refraction using Huygens wave theory of light with a neat diagram.
- b) Define "resolving power" of a compound microscope. On what factors does it depend?

26. a) Explain the formation of depletion layer and potential barrier in a p-n junction diode.

b) What is called Photo diode? Three photo diodes  $D_1$ ,  $D_2$  and  $D_3$  are made of semiconductors having band gaps of 2.5 eV, 2 eV and 3 eV respectively. Which one of them will be able to detect the wavelength of 600 nm?

OR

- a) With the help of a neat and labeled circuit diagram, explain how an n-p-n transistor can be used as an amplifier in common emitter configuration.
- b) Write an expression for voltage gain. Explain how the input and output voltages change by the phase difference of  $180^\circ$ .

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