

## SAMPLE PAPER 2010-11

PHYSICS  
CLASS XII

TIME- 3 HRS  
MM-70

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GENERAL INSTRUCTIONS: -

1. All the questions are compulsory
2. There are 30 questions in total. Question 1 to 8 carry one mark each, Question 9 to 18 carry two marks each, question 19 to 27 carry three marks each and questions 28 to 30 carry five 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. You have to attempt only one of the choices in such questions.
4. Use of calculator is not permitted.
5. You may use the following values of physical constants wherever necessary.

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

$$h = 6.63 \times 10^{-34} \text{ Js}$$

$$e = 1.602 \times 10^{-19} \text{ C}$$

$$\mu_0 = 4 \times 10^{-7} \text{ T m A}^{-1}$$

$$1/\epsilon_0 = 9 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$$

$$\text{Mass of electron } m_e = 9.1 \times 10^{-31} \text{ kg}$$

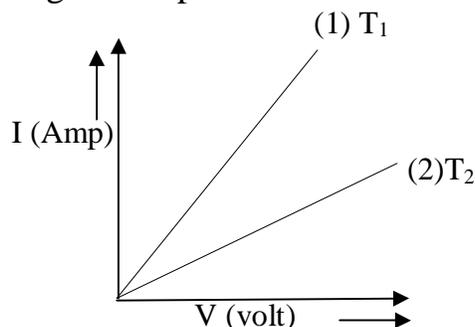
$$\text{Mass of neutron } m_n = 1.675 \times 10^{-27} \text{ kg}$$

$$\text{Boltzmann's constant } k = 1.381 \times 10^{-23} \text{ JK}^{-1}$$

$$\text{Avogadro's number } N_A = 6.022 \times 10^{23} / \text{mol}^{-1}$$

$$\text{Radius of earth} = 6400 \text{ km}$$

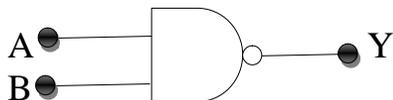
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1. The V-I graph for a given metallic wire at two temperatures are shown, which of these is for a higher temperature?



2. How does the resolving power of a compound microscope change, when refractive index of the medium between the object and the objective lens increases?

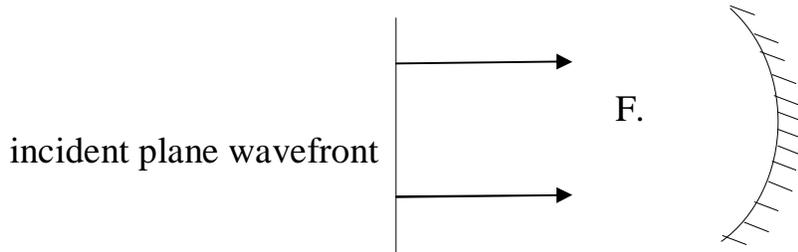
3. If the maximum and minimum voltage of an AM wave are 18V and 8V respectively, then find the value of modulation index.

4. Identify the gate and write its truth table.



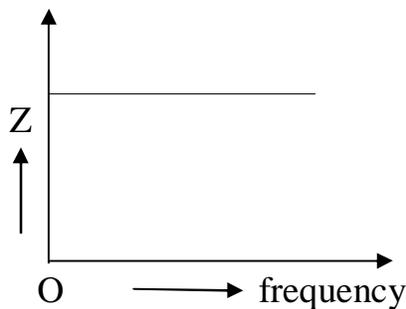
5. Plot the graph showing the variation in number of nuclei present in the radioactive sample with time during decay process.

6. Illustrate with the help of diagram, the action of concave mirror on a plane wavefront incident on it.

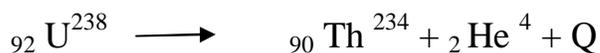


7. Relate electron mobility and relaxation time with each other.

8. The graph between reactance and frequency is given below for a c source applied across an element. Identify the element.



9. Calculate the energy released in MeV in the following nuclear reaction;



where

$$\begin{aligned} \text{mass of } {}_{92}\text{U}^{238} &= 238.050794\text{u}, \\ \text{mass of } {}_{90}\text{Th}^{234} &= 234.043630\text{u} \text{ and} \\ \text{mass of } {}_2\text{He}^4 &= 4.00260\text{u} \end{aligned}$$

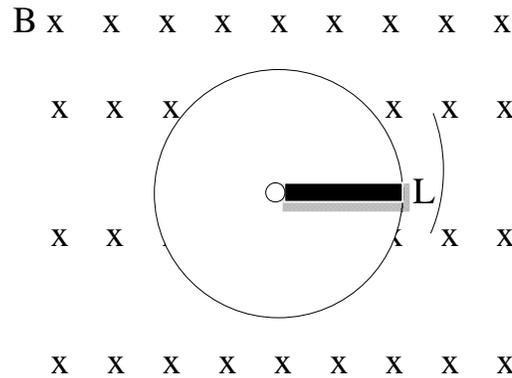
10. A chock coil in series with a lamp is connected to a dc line. The lamp is seen to shine brightly.

Give reason, why there is no change in the lamp's brightness on insertion of an iron core?

Predict the corresponding observations if the connection is to an ac line.

OR

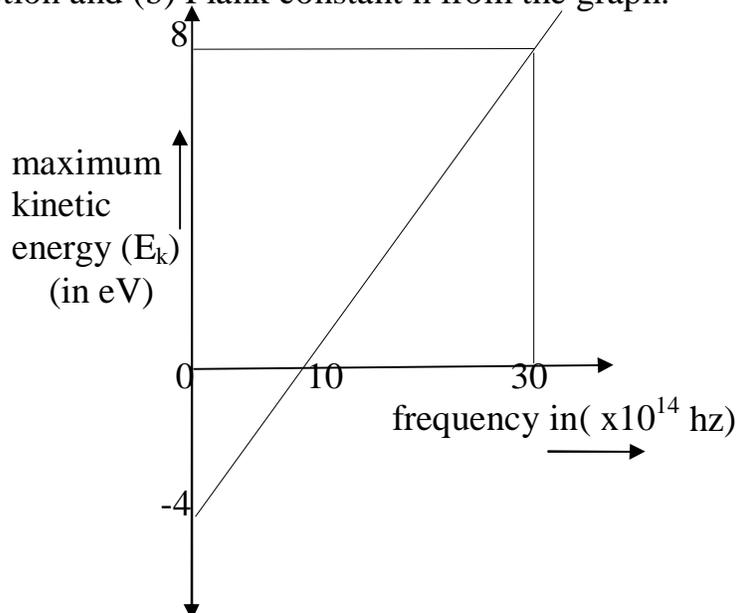
A conducting rod of length  $L$  with one end pivoted is rotated with uniform angular speed in a vertical plane, normal to uniform magnetic field  $B$ . Deduce an expression for the emf induced in this rod.



11. Derive an expression for magnetic field intensity that generate due to current carrying solenoid.

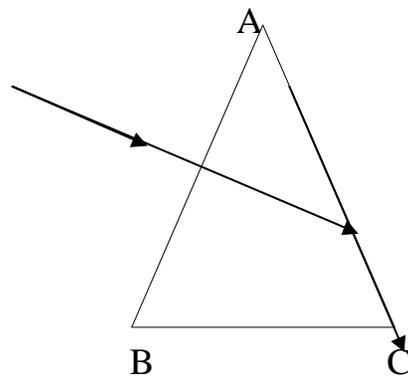
12. Draw a ray diagram for Cassegrain reflecting telescope, What is its magnifying power?

13. Given below is the graph between frequency ( ) of the incident light and the maximum kinetic energy ( $E_k$ ) of emitted photo electrons. Find (a) the work function and (b) Plank constant  $h$  from the graph.



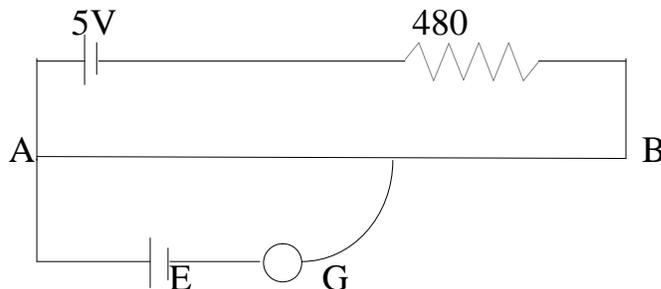
14. Mention the significance of Davison- Germer experiment. An  $e^-$  particle and a proton are accelerated from rest through the same potential difference. Find the ratio of de- Broglie wavelength associated with them.

15. A ray of light falls normally on a refracting face of a prism of refractive index  $3/2$ . Find the angle of prism if the ray just fails to emerge from the prism.



16. What do you mean by modulation and demodulation?

17. A 10m long wire of uniform cross section and  $20\ \Omega$  resistance is used in a potentiometer. The wire is connected in series with a battery of 5V along with an external resistance of  $480\ \Omega$ . If a cell of an unknown emf  $E$  is balanced at 6.0m length of wire, calculate (a) the potential gradient of potentiometer wire and (b) the unknown emf  $E$

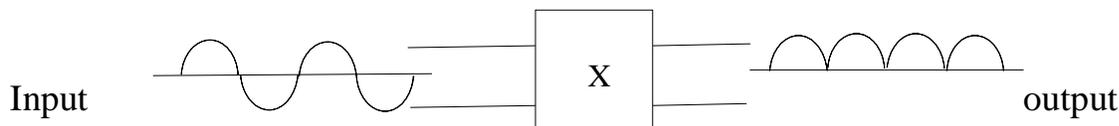


18. A transmitting antenna at the top of a tower has a height of 36m and the height of receiving antenna is 49m. What is the maximum distance between them, for satisfactory communication in the LOS mode?

19. Find an expression for speed and energy of an electron of hydrogen atom revolving in its  $n^{\text{th}}$  orbit.

20. The device X in box converts the input voltage into the output voltage waveform as shown in fig.

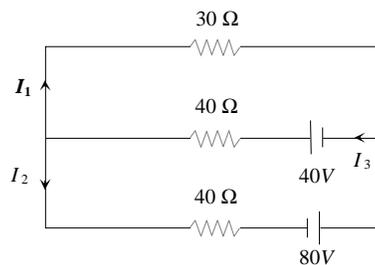
Identify the device. Draw the circuit diagram and explain its working.



21. Name the part of electromagnetic wave which vibrate not only electrons but entire atoms or molecules of a substance. Write its method of production, wavelength range and any one of its use.

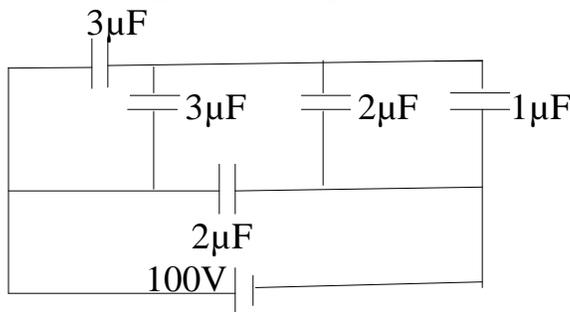
22. Define magnetization and susceptibility. Derive the relation between them.

23. Determine the voltage across  $30\ \Omega$  resistor.



24. Draw a circuit diagram to obtain the input and output characteristics of a NPN transistor in common emitter configuration. Give the shape of the V-I curves too.

25. The given figure shows a network of five capacitors connected to a  $100\text{V}$  supply. Calculate the total charge and energy stored in the network.



OR

Two capacitors with capacity  $C_1$  and  $C_2$  are charged to potential  $V_1$  and  $V_2$  respectively, and then connected in parallel. Calculate the common potential across

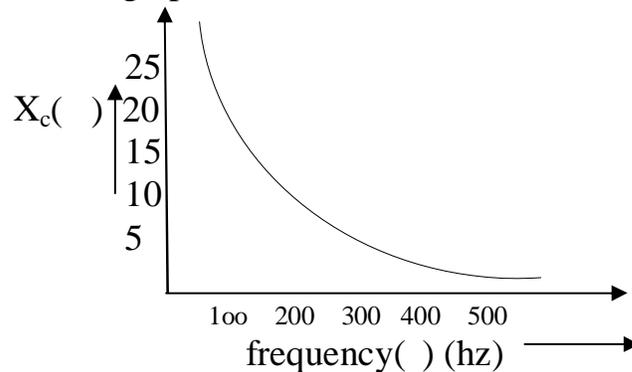
the combination, the charge on each capacitor and the loss in energy after combination.

26. Describe the motion of a charged particle in uniform magnetic field. Obtain an expression for the radius of the path of the charged particle moving perpendicular to uniform magnetic field. Show that the frequency of the revolution of the charged particle is independent of its speed.

27. The near point and far point of a defected eye are 75cm and 200cm. What type of lens should be used by the person to correct the vision? What would be the required focal length of the lens for the defect to be corrected?

28. Derive an expression for the impedance of an ac circuit containing L,C and R in series and find the expression for resonant frequency.

From the fig given below find the capacitance of the capacitor with the help of information given in the graph.



OR

Explain L-C oscillations of a circuit containing an inductor of inductance L and capacitor of capacitance C with the help of suitable diagrams.

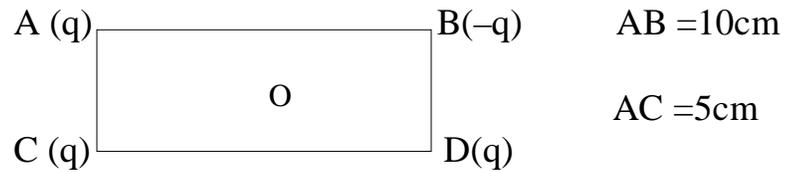
Define rms value of alternating current and deduce a relation between rms value and peak value of alternating current.

29. Draw a labeled diagram of Van de Graph generator. Explain its working with the help of principle involved. What are its limitations?

OR

A test charge  $q_0$  whose position vector is  $r$  is placed in the vicinity of three point charges  $q_1, q_2$  and  $q_3$  with position vector  $r_1, r_2$  and  $r_3$  respectively. Find the net electrostatics force on  $q_0$ .

Evaluate electric field and electric potential at center of the rectangle O from the fig. given below.



30. Derive lens makers formula with the help of suitable ray diagrams.

What change in focal length do you observe if a convex lens of refractive index  $\frac{3}{2}$  and focal length 12cm is immersed in a liquid of refractive index  $\frac{5}{3}$ ?

OR

What do you mean by diffraction? Show the single slit diffraction pattern on the screen.

Prove that the width of central bright fringe is double of the width of secondary maxima or minima in diffraction pattern.

How would the diffraction pattern affected if the monochromatic source of light is replaced by a source of white light?

