CBSE Guess Paper - 2015

Roll No.

CodeNo. **55/1**

Name: _____ Sec. _____ Roll No. _____

Max. Marks: 70   **PHYSICS– XII SCI.**   **Time allowed: 3 hours**

General Instructions:-

1. All the questions are compulsory
2. There are 30 questions in total. Question 1 to 5 carry one mark each, Question 6 to 10 carry two marks each, question 11 to 22 carry three marks each , question 23 carry 4 mark and questions 24 to 26 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 whereverneccessary.

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

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

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

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

$1/4\pi\varepsilon_0 = 9 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$
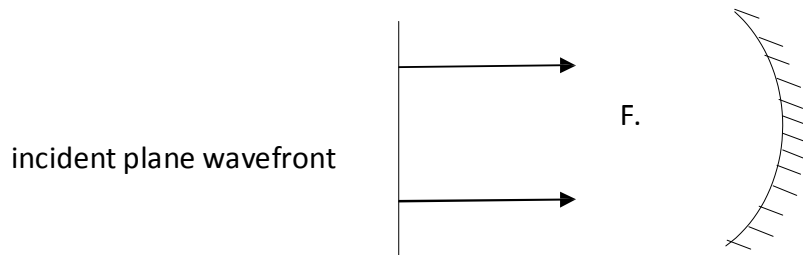
Mass of electron $m_e = 9.1 \times 10^{-31}$ kg Mass

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

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

Radius of earth = 6400 km

1 amu = 931 Mev

1. Draw the graph showing the temperature dependence of resistivity for a typical semiconductor. [1]

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? [1]

3. The mass number of two nuclei are in the ratio 27: 125. Find the ratio of their nuclear radii. [1]

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

incident plane wavefront

F.

[1]

5. What is the De- Broglie wavelength associated with a moving electron when accelerated with a potential difference of 100V. [1]

6. Draw the logic symbol of NAND gate . Write its truth table. [2]

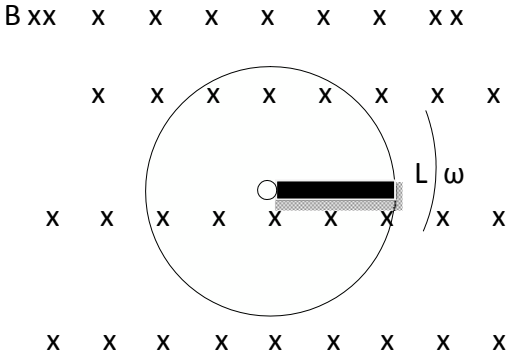7. Calculate the energy released in MeV in the following nuclear reaction;

$$_{92}U^{238} \longrightarrow {}_{90}Th^{234} + {}_{2}He^{4} + Q$$

where
mass of $_{92}U^{238}$ = 238.050794u,
mass of $_{90}Th^{234}$ = 234.043630u and
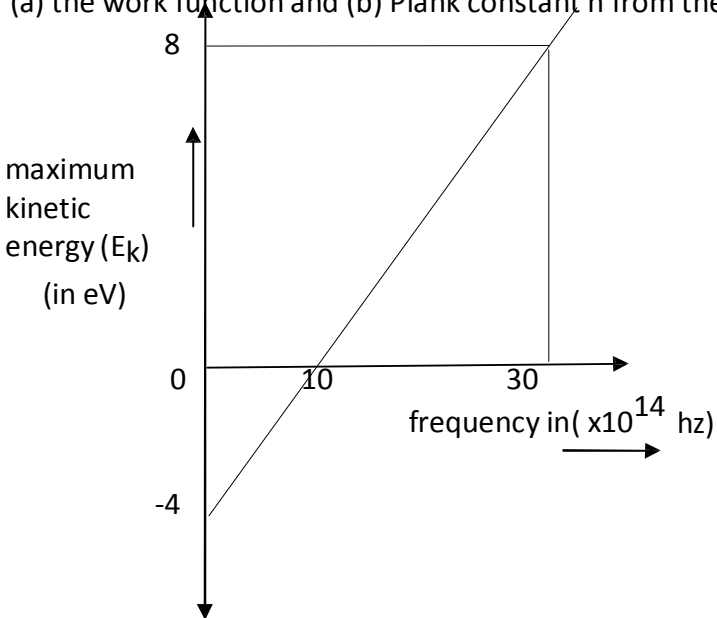mass of $_{2}He^{4}$ = 4.00260u   [2]

8. An inductor is connected 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.   [2]

OR

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

```
B x x   x   x   x   x   x   x   x x

      x   x  x   x   x   x   x   x

                                      L  ω
  x   x  x   x   x   x   x   x  x

      x   x   x   x   x   x   x   x   x
```

9. Derive an expression for magnetic field intensity that generate due to current carrying solenoid.   [2]

10. Draw a ray diagram for Cassegrain reflecting telescope, State one advantage of reflecting type of telescope over refracting type telescope.   [2]

11. Given below is the graph between frequency (ν) 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.

```
8 |-------------------------------|
  |                              /|
maximum |                      /   |
kinetic  |                   /      |
energy (E_k) |            /         |
(in eV)  |          /              |
  |           /                   |
0 |------/----10------30----------→
  |   /              frequency in( x10^14 hz)
  | /
-4 |/
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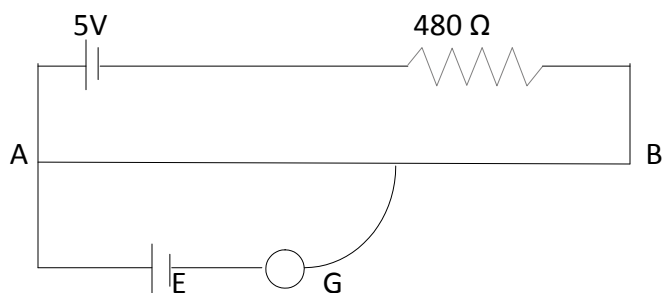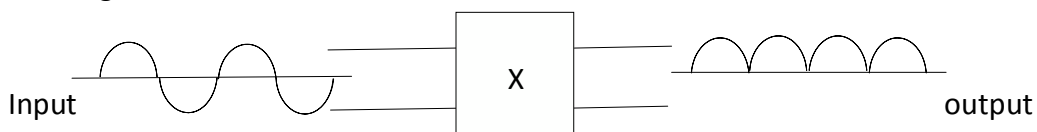   [3]

12. Sketch a schematic diagram depicting electric and magnetic fields for an electromagnetic wave propagating along x axis. Write two uses of microwaves.   [3]

13. What is modulation ? Explain why modulation is necessary? If the amplitude of the carrier

wave is 18V and that of the modulating wave is 8V respectively, then find the value of modulation index.   n   [3]

14. A 10m long wire of uniform cross section and 20Ω resistance is used in a potentiometer. The wire is connected in series with a battery of 5V along with an external resistance of 480 Ω. 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   [3]

15. 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?   [3]

16. Draw graph showing the variation of binding energy per nucleon and mass number of nuclei .State two important conclusion from the graph.   [3]

17. 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.

OR

Distinguish between a metal , semiconductor and insulator on the basis of energy band diagrams.

18. Derive the expression for drift velocity of free electrons in terms of relaxation time.[3]

19. State and explain the elements of earth' magnetic field with a neat and labeled diagram. And write the relation between them.   [3]

20. Show that in an ac circuit containing pure inductor the voltage is ahead of current by $\pi/2$.   [3]

21. An unpolarised light is incident on a boundary between two transparent media . State the condition when the reflected wave is plane polarized. Derive the relation between the polasizing angle and the refractive index.   [3]

22. 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.   [3]

23. Latesh used to go his school by bicycle. He studies electromagnetic induction in his physics class room , an ideal occurred to him. He attached a small dynamo and an LED with the axle of the cycle . This way during his ride he is enjoyed the glowing of LED. What values do you think is inculcated in Latesh in understanding physics. State the principle on which working of dynamo is based. Derive the expression for induced current.   [4]

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24. State Gauss's law of electrostatics. Use this law to derive the expression for electric field due to uniformly charged infinite thin plane sheet.
Calculate the amount of work done in turning an electric dipole of dipole moment **2 x 10^{-8}cm** from its position of its unstable equilibrium to position of stable equilibrium in a uniform electric field of intensity **10^{3}** N/C.

OR

Explain the principle of a device that can build up high voltages of the order of few million volts. Draw a schematic diagram and explain the working of this device. Is there any restriction in the upper limit of the high voltages set up in this machine. Explain.[5]

25. Draw the circuit diagram of common emitter transistor amplifier. Explain its working . Write the expression for voltage gain. What is the phase relationship between the input signal voltage and the output voltage.

OR

Draw the circuit symbol of zener diode .Draw its I – V characteristics of zener diode. Describe briefly with the help of a circuit diagram, how a zener diode acts as a voltage regulator. [5]

26. 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 3/2 and focal length 12cm is immersed in a liquid of refractive index 5/3?

OR

In young's double slit experiment describe briefly how bright and dark fringes are obtained on the screen kept in front of the double slit. Hence obtain the expression for fringe width.
The ratio of the intensities at minima to maxima in the YDSE is **9:25**. Find the ratio of the widths of the slits. [5]

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