Guess Paper – 2014
Class – XII
Subject –Physics

Series OSS

Roll No.

Date of the Exam 20.01.2014   CodeNo. 55/1

Name: _____ Sec. _____ Roll No. _____

i.   Please check that this question paper contains 03 printed pages.
ii. Code number given on the right hand side of the question paper should be written on the title page of the answer –book by the candidate.
iii. Please check that this question paper contains 29 questions. Please write down the serial no of the question before attempting it.
iv. 15 minutes time has been allotted to read this question paper.

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

General Instructions:-

● All questions are compulsory.

● 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 questions of five marks. You have to attempt only one the choices in such questions.

● Question numbers 1 to 8 are very short answer type questions, carrying one mark each.

● Questions numbers 9 to 16 are short answer type questions carrying two marks each.

● Question numbers 17 to 25 are also short answer type questions, carrying 3 marks each.

● Question numbers 26 value based type question, carrying four mark.

● Question numbers 27 to 29 are long answer type questions, carrying five marks each.

● Use of calculators is not permitted. However, you may use log tables, if necessary. You may use the following physical constants wherever necessary.

$c = 3 \times 10^8 \, ms^{-1}$
$h = 6.6 \times 10^{-34} \, Js$
$e = 1.6 \times 10^{-19} C$
$\mu_o = 4\pi \times 10^{-7} \, TmA^{-1}$
$1/4\pi\varepsilon_o = 9 \times 10^9 \, N \, m^2 C^{-2}$
Avogadro number $N_A = 6.023 \times 10^{23} \, mol^{-1}$
Mass of the neutron = 1.675×10^{-27} kg
Boltzmann constant, $k = 1.38 \times 10^{23} \, J \, K^{-1}$

Answer the following:

1. A device X can convert one form of energy into another . Another device Y can be regarded as a combination of a   transmitter and a receiver . Name the devices X and Y .

2. Two charges of magnitudes of **-2Q** and **+Q** are located at points **(a,0)** and **(4a,0)** respectively. What is the electric flux due to these charges through a sphere of radius **'3a'** with its centre at the origin.

3. A carbon resistor is marked in colour bands of red, black, orange and silver.What is the resistance and tolerance value of the resistor ?

4. The electric current in the wire PQ is increasing .
   In which direction does the induced current flow
   in the closed loop ?

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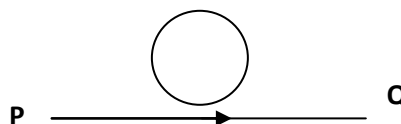
5. Two nuclei have mass number in the ratio 27: 125. What is the ratio of their nuclear densities?
6. Two metals A and B have work functions 4 eV and 10 eV respectively. Which metal has higher threshold wavelength ?
7. Draw a block diagram of a transmitter .
8. Name the vacuum tube which is used to produce microwaves.
9. A slab of material of dielectric constant 'k' has the same area as the plates of the parallel plate capacitor but has thickness d/2 , where d is the separation between the plates . Find the capacitance of the capacitor, when the dielectric slab is inserted between the plates .
10. A 60 μF capacitor is connected to a 110V , 60 Hz a.c. supply . Determine the rms value of current in the circuit .
11. Name the electromagnetic waves used for the following and arrange them according to the increasing order of their penetrating power (a) Remote sensing (b) used to treat muscular strains.
12. How the large scale transmission of electric energy over long distances done with the help of transformers ?
13. Draw a graph showing the variation of (i) electric field (E) and (ii) electric potential (V) with distance r due to a point charge Q .
14. In the adjacent figure, three light rays red (R) , green (G) and Blue (B) are incident on an isosceles right angled prism abc at the face ab. Explain with reason which ray of light will be transmitted through the face ac of the prism. The refractive index of the prism for red, green and blue light are **1.39 , 1.44 , 1.47** respectively.
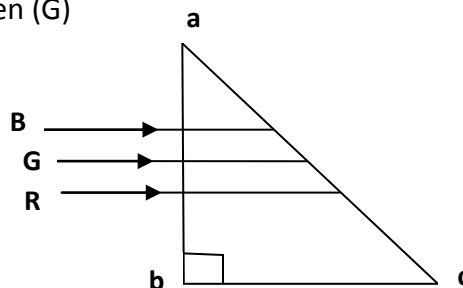
15. Write the truth table for the gates shown below
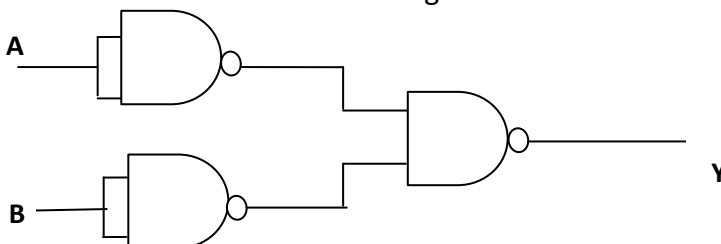
16. Define half life period of a radioactive substance . Write an expression for it .

OR

A given coin has a mass of 3.0g. Calculate the nuclear energy that would be required to separate all the neutrons and protons from each other. For simplicity assume that the coin is entirely made of $_{29}Cu^{63}$ (of mass 62.92960 u). The mass of the proton and neutrons are 1.00783 u and 1.0087 u respectively.

17. Using Gauss theorem, prove that the electric field at a point due to a uniformly charged infinite plane sheet is independent of the distance from it.
18. Define polarizing angle. Derive the relation connecting polarising angle and the refractive index of a medium.
19. Calculate the shortest and longest wavelengths of Lyman series . Given Rydberg's Constant R = 1.097 X 10^7 m^{-1}
20. What is Amplitude Modulation ? Derive an expression for amplitude modulated wave .
21. Show that the De-Broglie wave length λ of electrons accelerated through a potential difference of V volts can be expressed as $\lambda = \dfrac{h}{\sqrt{2meV}}$
22. Define the term resistivity of a conductor. Give its SI unit. Show that the resistivity of a conductor is given by $\rho = \dfrac{m}{ne^2 \tau}$ where the symbols have their usual meanings.

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23. In the following network as shown in the figure calculate the value of the current I_1, I_2 and I_3 .
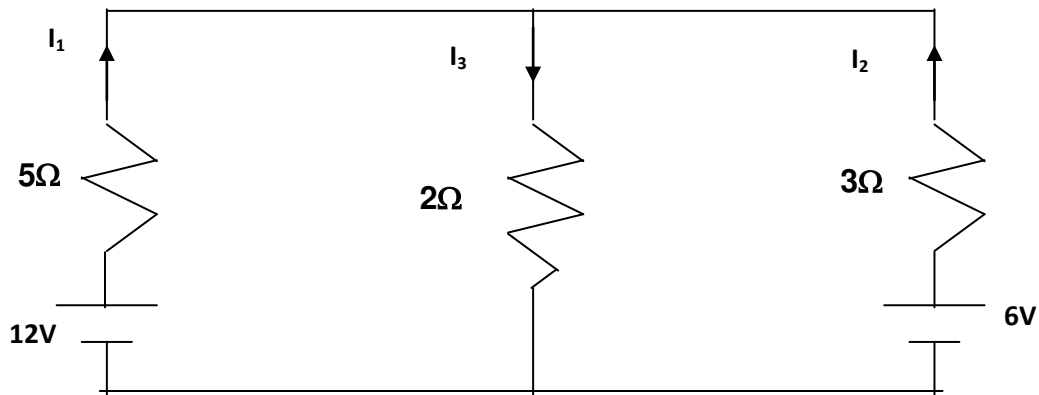
24. A bar magnet of magnetic moment 1.5 J/T lies aligned with the direction of a uniform magnetic field of 0.22T.
    (a) what is the amount of work required by an external torque to turn the magnet so as to align its magnetic moment. (i) normal to the field direction and (ii) opposite to the field direction?
    (b)What is the torque on the magnet in cases (i) and (ii)

    OR

    A wire of AB carrying a steady current of 12A and is lying on the table. Another wire CD carrying current 5A is held directly above AB at a height of 1 mm. Find the mass per unit length of the wire CD so that it remains suspended at its position when left free. Give the direction of the current flowing in CD with respect to that in AB. (take g= 10 m/sec^2)

25. A rectangular coil of N turns, area A is held in a uniform magnetic field B .If the coil is rotated at a steady angular speed ω , deduce an expression for the induced emf in the coil at any instant of time .

26. Naveen was seeing a person in a group discussion on "Human eye and its Defects ". In the evening he noticed that his father was reading the news paper by placing it at a distance of about 50 cm from his eyes . He immediately advised him for the check up of his eyes by an eye specialist .
    (a) What values was displayed by Naveen ?
    (b) Suggest the focal length and power of the reading glass for his father ,so that he can easily read the news paper placed at 25 cm from the eye .

27. With the help of a diagram ,explain the principle and working of a moving coil galvanometer .What is the importance of a radial magnetic field and how   it is produced ?   "Increasing the current sensitivity of a galvanometer may not necessarily increase its voltage sensitivity." Justify this statement .

    OR

    Draw a schematic diagram of a cyclotron .Explain its underlying principle and working, stating clearly the function   of the electric field and magnetic fields applied on a charged particle . Deduce an expression for the period of revolution and show that it doesn't depend upon   the speed of the charge particle .

28. Draw the circuit diagram of a common emitter amplifier using an n-p-n transistor. What is the phase difference between the input output signal voltage. Draw the input and output waveforms of the signal. Write the expression for its voltage gain.

    OR

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Why is a zener diode considered as a special purpose semiconductor diode? Draw the V-I characteristics of a zener diode and explain briefly how the reverse current suddenly increases at the breakdown voltage. Describe briefly with the help of a circuit diagram how a zener diode works to obtain a constant dc voltage from the unregulated dc output of a rectifier

29. Draw a ray diagram for formation of image of a point object by a thin double convex lens having radii of curvature R_1 and R_2. Hence derive lens maker's formula for a double convex lens. State the assumptions made and the sign convention used.

OR

With the help of a ray diagram , explain the formation of the image in a compound microscope. Derive an expression for its magnifying power when the final image is formed at the near point .

A 4.5 cm needle is placed 12 cm away from a convex mirror of focal length 15cm. Find the location of the image and the magnification.

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SET I BLUE
PRINT -I

CHAPTER NAME	VSA (1mark)	SA (2marks)	SA-2 (3marks)	Value based	Long Question (5marks)	Total
1. ELECTROSTATICS	1	2	1			8
2.CURRENT ELECTRICITY	1		2			7
3.MAGNETIC EFFECT OF CURRENT			1		1	8
4.ELECTROMAGNETIC INDUCTION AND AC	1	2	1			8
5.ELECTROMAGNETIC WAVES	1	1				3
6.OPTICS		1	1	1 1	1	14
7.DUAL NATURE OF MATTER	1		1			4
8.ATOMS AND NUCLEI	1	1	1			6
9.ELECTRONIC DEVICES		1			1	7
10.COMMUNICATION SYSTEMS	2		1			5
Total	8	16	27	4	15	70

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