Sample Paper – 2014
Class – XII
Subject –Physics

Series OSS

Roll No.							

Date of the Exam 04.11.2013 **Code No. 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:-

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- 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 marks each.
- 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.

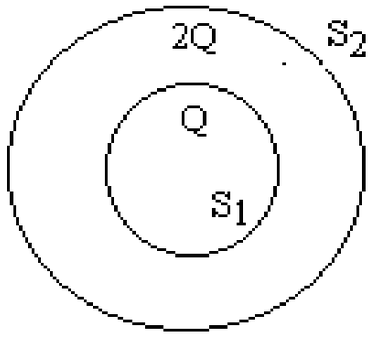
  $c = 3x\ 10^{8}\ ms^{-1}$
  $h = 6.6 \times 10^{-34}\ Js$
  $e = 1.6 \times 10^{-19} C$
  $\mu_o = 4\pi \times 10^{-7}\ TmA^{-1}$
  $1/4\pi\varepsilon_o = 9 \times 10^{9}\ N\ m^2C^{-2}$
  Avogadro number $N_A = 6.023 \times 10^{23}\ mol^{-1}$
  Mass of the neutron $= 1.675 \times 10^{-27}\ kg$
  Boltzmann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

Answer the following:

1. An electron beam projected along +X axis, experiences a force due to a magnetic field along the + Y-axis. What is the direction of the magnetic field?
2. The instantaneous current from an ac source is I = 6 sin 314t. What is the rms

value of the current?

3. A bulb connected in series with a solenoid is lighted by ac source. If a soft iron core is introduced in the solenoid, what will happen to the brightness of the bulb?
4. What is the de Broglie wavelength associated with an electron, accelerated through a potential difference of 100V?
5. Two thin lenses + 6D and -2D are in contact. What is the focal length of the combination?
6. The energy of the electron in hydrogen atom in its ground state is – 13.6 eV. Calculate its energy in its 1st excitation state.
7. The current gain in a n-p-n transistor in the CE mode is 100. If the collector current is 20mA find the base current?
8. How does the conductivity of a semiconductor change with increase of temperature?
9. Define the term temperature coefficient of resistivity. Draw a graph showing the variation of resistivity with temperature for copper.
10. S_1 and S_2 are two hollow concentric sphere enclosing charges Q and 2Q respectively as shown in fig.



(a)What is the ratio of electric flux through S_1 & S_2?

(b)How will the electric flux through the sphere change, if a medium of dielectric constant 4 is introduced in the space inside S_1 in place of air?

11. A cell of emf 2 V and internal resistance 0.1 Ω is connected to a 3.9 Ω external resistance. What will be the potential difference across the terminals of the cell?
12. How will a dia & ferro magnetic material behave when kept in a non-uniform external field? Give two examples each.
13. A double concave lens of glass of R.I. 1.6 has radii of curvature of 40cm, 60cm. Calculate its focal length.
14. Draw the block diagram of a simple modulator for obtaining an amplitude modulated signal.

OR

A transmitting antenna of length 81m. Calculate the distance to which the signal is transmitted. (Radius of earth 6400 km)

15. Define half life of a radioactive substance. Derive the relationship between half life and decay constant.
16. Define electric dipole. Derive an expression for the torque experienced by the electric dipole placed inside an external magnetic field.
17. State Guass's theorem in electrostatics. Derive an expression for electric field intensity produced by charged thin sheet using this theorem.
18. Write the principle of potentiometer. Explain with diagram how will you measure internal resistance of a cell using potentiometer.
19. A sinusoidal emf is applied to a circuit containing a capacitor only . Show that the current leads the voltage by $\frac{\pi}{2}$ radian.

OR

A sinusoidal emf is applied to a circuit containing a inductor only . Show that the

current lags behind the voltage by $\frac{\pi}{2}$ radian.

20. A compound microscope consists of an objective lens of focal length 2 cm and an eyepiece of focal length 6.25cm separated by a distance of 15cm. How far from the objective lens should an object be placed in order to obtain the final image at least distance of distinct vision?
21. The fission properties of $^{239}Pu_{94}$ is similar to those of $^{235}Pu_{92}$. The average energy released per fission is 180MeV. How much energy in MeV is released if all the atoms in 1 kg of $^{235}Pu_{92}$ undergoes fission.
22. Sketch the graph between frequency of incident radiations and stopping potential for a given photosensitive material. What information can be obtained from the value of slope of this graph. If the intensity of the incident light on a photosensitive material is doubled what change will you observe in the stopping potential?

23. Draw a labeled ray diagram to show the image formation by an astronomical telescope when final image is forms at least distance of distinct vision. Derive an expression for its magnifying power.
24. Name the constituent radiation of electromagnetic spectrum which
    (a) Is used in operating RADAR.
    (b) Is used for studying crystal structure.
    (c) Is similar to the radiations emitted during the decay of radioactive nuclei.
    (d) Has a wavelength range between 390nm and 770nm.
    (e) Is absorbed from sunlight by ozone layer.
    (f) Produces intense heating.
25. What is modulation? What is the need of modulation in communication system?
26. Mr. Bhatia a physics teacher , was performing an experiment in the lab using dry cell. The dry cell was weak giving less voltage and was not sufficient to give proper reading. One of the students asked " sir , can't we step up the voltage using a transformer"? . The teacher replied " No we cannot step up dc voltage using step up transformer". He explained the students the principle of working of a transformer. The students then constructed a transformer for their physics project and studied its working in details.
    (i) What are the values displayed by the students?
    (ii) What is the principle of a transformer?
    (iii) Why can't a transformer be used to step up dc voltage.
    (iv) If the transformer ratio of a transformer is 100 , and the number of turns in the primary is 200 ,find the number of turns in the secondary coil.

27. In a Young's double slit experiment, deduce the conditions for constructive and destructive interference. Hence write the expression for the distance between the two consecutive bright or dark fringes. Also plot a graph of intensity distribution Vs the position ' x 'on the screen.

OR

Explain the phenomenon of diffraction of light at a single slit to show the formation of diffraction fringes. Show graphically the variation of intensity with angle in this diffraction pattern. Why secondary maxima are less intense than the central maximum?

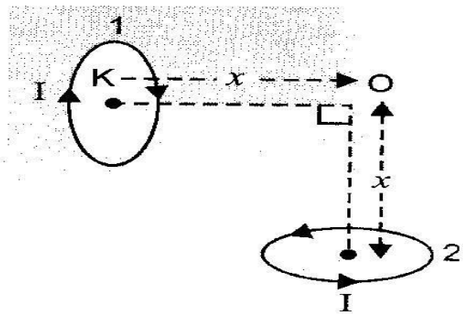
28. Draw a circuit diagram to study the input and output characteristic of an n-p-n transistor in common emitter mode. Explain these characteristics graphically.

OR

What is a rectifier. Explain the principle and working of a full wave rectifier.

29. (a) Using Biot- Savart's law derive an expression for magnetic field intensity on the axis of a circular coil carrying current.

(b) To small circular loops each of radius R marked 1 and 2 carrying equal currents are placed with the geometrical axis perpendicular to each other as shown in fig. find the magnitude and direction of the net magnetic field produced at the point O.



OR

Describe the principle, construction and working of a moving coil galvanometer. When a galvanometer said to be sensitive. Define the current sensitivity and voltage sensitivity of a galvanometer.

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Paper Submitted By:

Name ASHIS KUMAR SATAPATHY

Email ashissatapathy1975@gmail.com

Phone No. 09437791264