

CBSE GUESS - 2015
Class – XII
Subject - Physics

Time: 3 Hrs

MM:70

Set A

General Instructions:

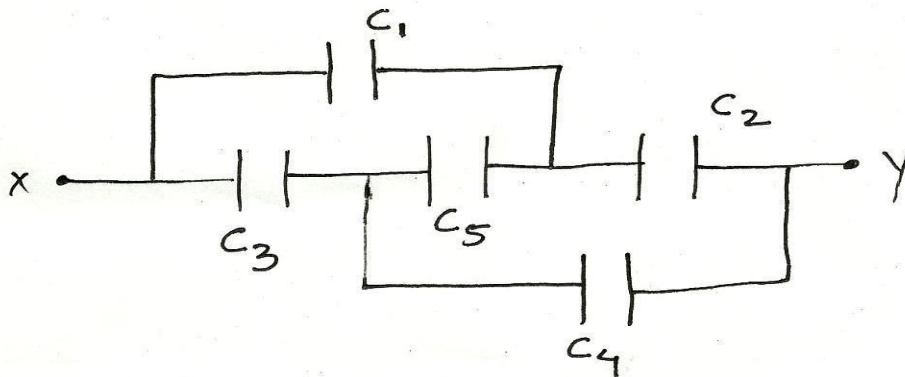
- (i) All questions are compulsory.
- (ii) Q.No. 1 to 5 are very short answer type questions, carrying one mark each.
- (iii) Q.No numbers 6 to 10 are short answer type questions, carrying two marks each.
- (iv) Q.No. 11 to 22 are also short answer type questions, carrying three marks each.
- (v) Q.No. 23 is a value based question carry 4 mark.
- (vi) Q.No 24 to 26 are long answer type questions, carrying five marks each.

1. The capacitance of a conductor depends upon its shape and size. It does not depend upon the nature of the material of the conductor but depends upon the nature of the medium in which it is placed. How?
2. Draw a graph to show the variation of resistance of a metal wire as a function of its diameter, keeping length and temperature constant.
3. Why do magnetic lines of force prefer to pass through iron than air?
4. Arrange the following in descending order of wavelength: X rays, y rays, micro waves and visible light.
5. What is one henry?
6. Find the effective capacitance between the terminals that $C_1= 5$ micro farad, $C_2= 10$ micro farad, $C_3= 2$ micro farad, $C_4= 4$ micro farad, $C_5= 10$ micro farad.

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OR

Distinguish between electric potential and potential energy and state the relation between these.

7. What is drift velocity? Establish the relation between drift velocity and electric current.
8. The earth's core is known to contain iron. Yet geologists do not regard this as source of earth's magnetism. Why?
9. How would the following be affected in the absence of atmosphere around the earth.
 - (i) Surface temperature of earth
 - (ii) Range of radio wave transmission.
10. Draw a labeled diagram of Hertz's set up to produce electromagnetic waves.
Draw a diagram showing propagation of electromagnetic waves?
11. Using Gauss' theorem, derive an expression for electric field at a point due to a line charge. Show that the electric field at the surface of a charged conductor is

$$\vec{E} = \frac{\sigma}{\epsilon_0} \hat{n}$$

$\left\{ \begin{array}{l} \sigma = \text{surface charge density} \\ \hat{n} \text{ unit vector normal to} \\ \text{the surface in outward} \\ \text{direction.} \end{array} \right\}$

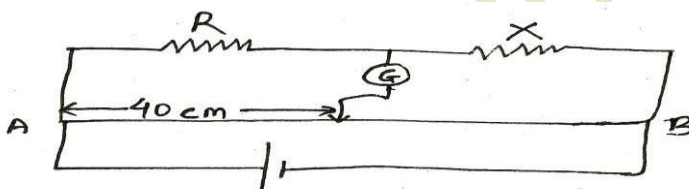
given by

12. 64 drops of the same size are charged to 300v each. These drops coalesce to form a bigger drop. Calculate the potential of the bigger drop?

OR

Find total work done in rotating a dipole in electric field or potential energy of a dipole in an electric field.

13. Write the principal on which the working of a metre bridge is based. In an experiment on metre bridge, a student obtain the balance point at the point J such that $AJ = 40\text{ cm}$ as shown in the figure. The values of 'R' and 'X' are both doubled and then interchanged. Find the new position of the balance point. If the galvanometer and battery also interchanged how the balance point affected?



14. Give

the principle of

a potentiometer. Explain how will you use potentiometer to

- (i) To measure the internal resistance of the cell and
- (ii) To compare the emfs of two cells.

15. Deduce the condition for balance in a Wheatstone bridge using the principle of Wheatstone bridge. Describe the method to determine the specific resistance of a wire in the laboratory. Draw the circuit diagram and write the formula used. Write any two precautions you would observe while performing the experiment.

16. Using Ampere's circuital law, derive an expression for the magnetic field along the axis of a toroidal solenoid.

17. With the help of a labeled diagram, explain the principle and working of a moving coil galvanometer and explain current sensitivity and voltage sensitivity.

18. What are permanent magnets? What is an efficient way of preparing a permanent magnet? Write two characteristics properties of materials which are required to select them for permanent magnet.
19. Define mean value and root mean square value of alternating current. Derive an expression for root mean square value of alternating current.
OR
Define self inductance. Show mathematically that an ideal inductor does not consume any power in an a.c. circuit.
20. Derive the expression for resonance frequency of parallel LCR- circuit. Why it is known as rejection circuit? Plot a graph between its current and frequency.
21. An alternating emf is supplied to a pure inductor. Investigate the phase relationship between current flowing through it and the applied emf. Hence explain why the power dissipated across an ideal conductor is always zero?
22. Electromagnetic waves of frequency 5×10^{14} Hz are passed through a liquid. The wavelength of the wave in the liquid is measured to be 4.5×10^{-7} M calculate
- the wavelength of E.M. wave in vacuum.
 - Velocity of E.M. wave in the liquid and
 - Refractive index of the liquid.
- Given velocity of E.M. waves in vacuum = 3×10^8 m/s
23. A picnic was arranged by school for the student of XII class. After some time it was raining heavily accompanied by thundering & lightening. The Student got afraid. Some students went inside the room. Two students asked for the key of the car and sat inside the car folding their legs on the seat. The other students called them to come out but they refused. They knew that charge inside the conducting shell is zero as told by the teacher and told others not to stand near the electric pole when it is lightening.
- What value was displayed by these students?

24. Define corecivity and remenance. How are soft iron and hard steel distinguished by the values of these magnetic properties?

Sketch the hysteresis loop for soft iron and hard steel. What do you infer about these materials from their hysteresis loop?

OR

Explain, how an atom behaves as a magnetic dipole. Find an expression for the magnetic dipole moment of an atom. Also define Bhor Magneton.

25. Explain what is meant by mutual induction and mutual inductance. Give the practical unit of mutual inductance. How it can be defined in terms of induced emf and rate of growth of current?

Derive expression for mutual inductance between two long solenoid.

OR

(A) Derive the relationship between peak and r.m.s. value of current in an a.c. circuit.

(B) Describe briefly with the help of a labeled diagram working of a step- up transformer.

A step up transformer converts a low voltage into high voltage . does it not violate the principle of conservation of energy?

26. What do you understand by electric resistance of a conductor? Define its S.I Units. Prove that resistance of a conductor is given by

$$R = \frac{m l}{n e^2 \tau A}$$

Where symbols has usual meaning.

OR

Obtain the condition for maximum current through a resistor, when a number of cells are connected (i) in series and (ii) parallel.

The amount of charge passing through the cross-section area of wire in time t is given by $q = at^2 + bt + c$. find the dimension formula of A, B, and C

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