

## COMMON QUARTERLY EXAMINATION - SEPTEMBER 2019

Standard - 12

Reg No

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## PART - III - PHYSICS

Time Allowed: 2.30 Hours

Maximum Marks: 70

- Instructions:**
1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
  2. Use Blue or Black ink to write and underline and pencil to draw diagrams.

## PART - I

- Note:**
- i) Answer all the questions. 15×1=15
  - ii) Choose the most appropriate answer from the given four alternatives and write the option code and corresponding answer.

- 1) In Joule's heating Law, when I and t are constant, if the H is taken along the Y-axis and  $I^2$  along X-axis, the graph is
  - a) Straight line
  - b) Parabola
  - c) Circle
  - d) Ellipse
- 2) Two point charges A and B having charges +Q and -Q respectively, are placed at certain distance, apart and force acting between them is F. If 25% charge of A is transformed to B, then force between the charges becomes.
  - a)  $\frac{16}{9}F$
  - b)  $\frac{4}{3}F$
  - c) F
  - d)  $\frac{9}{16}F$
- 3) A parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates and each area doubled then which is the Quantity that will change?
  - a) Capacitance
  - b) Charge
  - c) Voltage
  - d) Energy density
- 4) Touching the electrical switches and circuits with the wet hands is always dangerous because,
  - a) Human body contains large amount of water
  - b) Resistance of wet hand is low
  - c) Pure water conduct electric current
  - d) Resistance of wet hands are large
- 5) A Copper wire of Cross-sectional area  $0.5 \text{ mm}^2$  carries a current of 0.2A. If the free electron density of Copper is  $8.4 \times 10^{28} \text{ m}^{-3}$  then the drift velocity of free electron is \_\_\_\_\_.
  - a)  $0.6 \times 10^{-2} \text{ ms}^{-1}$
  - b)  $0.03 \times 10^{-3} \text{ ms}^{-1}$
  - c)  $30 \times 10^{-3} \text{ ms}^{-1}$
  - d)  $0.03 \times 10^3 \text{ ms}^{-1}$
- 6) The equation for an alternating current is given by  $I = 77 \sin 314 t$  find the frequency of current
  - a) 314 Hz
  - b) 50 Hz
  - c) 77 Hz
  - d) zero

- 7) In a series RL circuit the resistance and inductive reactance are same. Then the phase difference between the voltage and current in the circuit is
- a)  $\frac{\pi}{4}$       b)  $\frac{\pi}{2}$       c)  $\frac{\pi}{6}$       d) 0
- 8) The horizontal component and vertical components of earth's magnetic field at a place are 0.15G and 0.26G respectively. The angle of dip is \_\_\_\_\_.
- a)  $0^\circ$       b)  $30^\circ$       c)  $45^\circ$       d)  $60^\circ$
- 9) Which of the following electromagnetic wave is used for viewing objects through fog?
- a) Microwave      b) Gamma rays      c) X-rays      d) Infrared rays
- 10) An electric dipole is placed at an alignment angle of  $30^\circ$  with an electric field of  $2 \times 10^5 \text{ NC}^{-1}$ . It experiences a torque equal to 8Nm. The charge on the dipole if the dipole length is 1cm is \_\_\_\_\_.
- a) 4 mC      b) 8 mC      c) 5 mC      d) 7 mC
- 11) The electric and magnetic fields of an electromagnetic wave are \_\_\_\_\_.
- a) in phase and perpendicular to each other.  
b) out of phase and not perpendicular to each other.  
c) in phase and not perpendicular to each other.  
d) out of phase and perpendicular to each other.
- 12) A non conducting charged ring of charge q mass m and radius r is rotated with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is \_\_\_\_\_.
- a)  $\frac{q}{m}$       b)  $\frac{2q}{m}$       c)  $\frac{q}{2m}$       d)  $\frac{q}{4m}$
- 13) The magnitude of the magnetic field of a long, straight wire carrying a current of 2A at distance of 1m from it is \_\_\_\_\_.
- a)  $1 \times 10^{-7} \text{ T}$       b)  $2 \times 10^{-7} \text{ T}$       c)  $3 \times 10^{-7} \text{ T}$       d)  $4 \times 10^{-7} \text{ T}$
- 14) A cylinder of radius R and length L is placed in a uniform electric field E parallel to the cylinder axis. The total flux for the surface of the cylinder is given by
- a)  $2\pi R^2 E$       b)  $\frac{\pi}{E} R^2$       c)  $(\pi R^2 - \pi R)/E$       d) Zero
- 15) A graph between the magnitude of the magnetic flux linked with a closed loop and time is given above. From the graph select the regions of the graph, in the ascending order of the magnitude of induced emf produced as a result of change in magnetic flux.      Magnetic flux



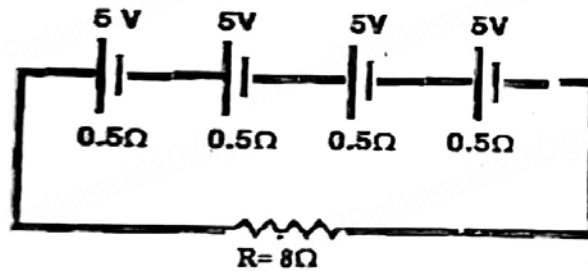
Time

- a)  $a < b < c < d$       b)  $d < c < b < a$       c)  $a < c < d < b$       d)  $b < d < c < a$

## PART - II

Answer any six questions and question number 24 is compulsory:  $6 \times 2 = 12$

- 16) What are the differences between coulomb force and gravitational force?
- 17) A parallel plate capacitor has square plates of side 5 cm and separated by a distance of 1mm, then calculate the capacitance of the capacitor.
- 18) Define electrical resistivity. Give its SI unit.
- 19) From the given circuit calculate the following quantities.

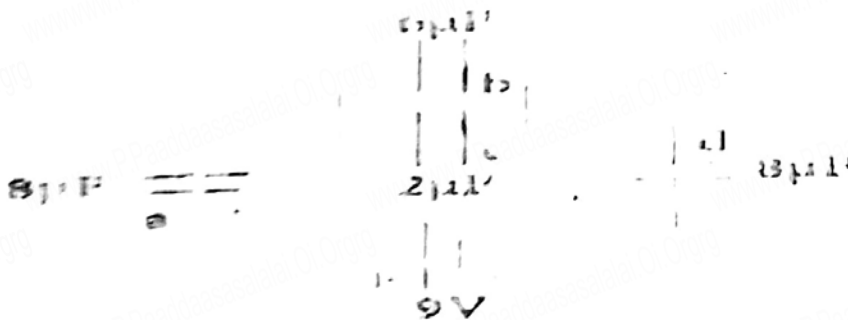


- i) Equivalent emf of the combination
  - ii) Equivalent internal resistance
  - iii) Total current
  - iv) Potential difference across external resistance
- 20) State Ampere's circuital Law.
  - 21) State Faraday's Laws of Electromagnetic Induction.
  - 22) State any two advantage of three phase alternator.
  - 23) Write any four uses of X-rays.
  - 24) In a magnetic field of 0.05T, area of a coil changes from  $101 \text{ cm}^2$  to  $100 \text{ cm}^2$  without changing the resistance which is  $2\Omega$ . What is the amount of charge that flow during this period?

## PART - III

Answer any six questions and question number 33 is compulsory:  $6 \times 3 = 18$

- 25) State the rules followed while drawing electric field lines for the representation of electric field.
- 26) For the given capacitor configuration



- a) Find the charges on each capacitor  
b) Potential difference across each capacitor
- 27) Explain the equivalent resistance of a parallel resistor network.  
28) Discuss the conversion of a galvanometer into a Voltmeter.  
29) Compare dia, para, ferro magnetic materials.  
30) How will you induce an emf by changing the area enclosed by the coil?  
31) Write down any six properties of Electromagnetic waves.  
32) If the relative permeability and relative permittivity of the medium is 1.0 and 2.25 respectively. Find the speed of the electromagnetic wave in this medium.  
33) Charges of  $+\frac{10}{3} \times 10^{-9}$  C are placed at each of the four corners of a square of side 8 cm. Find the potential at the intersection of the diagonals.

**PART - IV****Answer all the questions:****5×5=25**

- 34) a) Explain in detail the construction and working of a Van de Graaff generator.

**(OR)**

- b) Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current.

- 35) a) Derive an expression for electrostatic potential due to an electric dipole.

**(OR)**

- b) Obtain the condition for bridge balance in wheatstone's bridge.

- 36) a) Explain the force between two long parallel current carrying conductors.

**(OR)**

- b) Explain the determination of the internal resistance of a cell using potentiometer.

- 37) a) Calculate the magnetic induction at a point on the axial line of a bar magnet.

**(OR)**

- b) Explain the working of single phase AC generator with necessary diagram.

- 38) a) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

**(OR)**

- b) What is emission spectra? Explain their types.

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