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SRI RAMANA MAHARSHI MATRICULATION HIGHER SECONDARY SCHOOL
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FIRST MID-TERM TEST – JULY 2023

Std.	:	**12**	Maximum Marks	: 50
Subject	:	**PHYSICS**	Time Allowed	: 01.30 Hours

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.   10x1=10

(ii) Choose the most appropriate answer from the given **four alternatives** and write the **option code** and the corresponding answer.

1. An electric dipole is placed at an alignment angle of 30^0 with an electric field of 2×10^5 N C^{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is

   (a)   4 mC   (b)   8 mC   (c)   5 mC   (d)   7 mc

2. A A toaster operating at 220V has a resistance of 110 Ω. The power is

   (a)   240W   (b)   440W   (c)   2W   (d)   480W

3. In Joule's heating law, when R and t are constant, if the H is taken along the y axis and I^2 along the x axis, the graph is

   (a)   straight line   (b)   parabola   (c)   circle   (d)   ellipse

4. If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion.

   (a)   Q remains the same, C is doubled   (b)   Q is doubled, C doubled

   (c)   C remains same, Q doubled   (d)   Both Q and C remain same

5. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is

   (a)   0.2 Ω   (b)   0.5 Ω   (c)   0.8 Ω   (d)   1.0 Ω

6. Two points A and B are maintained at a potential of 7 V and –4 V respectively. The work done in moving 50 electrons from A to B is

   (a) 8.80×10^{-17}J   (b) -8.80×10^{-17}J   (c) 4.40×10^{-17}J   (d) 5.80×10^{-17}J

7. If current is doubled the power will increase by

   (a)   2 times   (b)   4 times   (c)   8 times   (d)   16 times

8. How many electrons will have a charge of one coulomb?

   (a) 6.25×10^{18} (b) 6.25×10^{19} (c) 1.6×10^{18} (d) 1.6×10^{19}

9. The value of dielectric strength of air is

   (a) 6×10^6 Vm^{-1} (b) 5×10^6 Vm^{-1} (c) 3×10^6 Vm^{-1} (d) 1×10^6 Vm^{-1}

10. The electric field is zero everywhere inside the arbitrarily conductor, the net electric flux is over the Gaussian surface

    (a)   zero   (b)   maximum

    (c)   minimum   (d)   None of the above

[Turn over

PART – II

Note   :   Answer **any five** questions. Question No. **18** is compulsory.   5x2=10

11.   What is corona discharge?

12.   What is called electric dipole? Give an example.

13.   During lightning, it is safer to sit inside bus than in an open ground or under tree. Why?

14.   Define current density. Give its unit.

15.   What are the properties of the substance used as heating element?

16.   State Kirchhoff's first law (current rule or junction rule).

17.   What are called non-polar molecules? Give examples.

18.   If the resistance of coil is 3Ω at 20^0C and $\propto = 0.004/^0C$ then, determine its resistance at 100^0C.

PART – III

Note   :   Answer **any five** questions. Question No. **26** is compulsory.   5x3=15

19.   Obtain a relation between current and drift velocity.

20.   Derive the expression for resultant capacitance, when capacitors are connected in series.

21.   State Kirchhoff's First and Second Rules.

22.   Give the applications and disadvantage of capacitors.

23.   Explain the principle of Potentiometer.

24.   Derive an expression for capacitance of parallel plate capacitor.

25.   Derive an expression for torque experienced by an electric dipole placed in the uniform electric field.

26.   Calculate the electric flux through the rectangle of side 5 cm and 10 cm kept in the region of a uniform electric field $100 \, NC^{-1}$. The angle θ is 60° . If θ becomes zero, what is the electric flux?

PART – IV

Note   :   Answer **all** the questions.   3x5=15

27.   (a)   Explain in detail the construction and working of a Van de Graaff generator.

(OR)

     (b)   Explain the determination of the internal resistance of cell using voltmeter.

28.   a)   Calculate the electric filed due to a dipole on its axial line.

(OR)

     (b)   Describe the microscopic model of current and obtain microscopic form of Ohm's Law.

29.   (a)   State Gauss Law in electrostatics. Obtain an expression for Electric field due to an infinitely long charged wire.

(OR)

     (b)   Obtain the condition for bridge balance in Wheatstone's bridge.

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