CO

12-A1

COMMON FIRST MID - TERM TEST - 2019

STANDARD - XII

PHYSICS

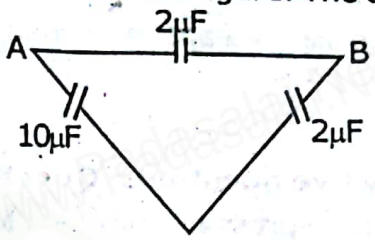
Reg.No. 1 3

Time : 1.30 hours *Marks: 50*

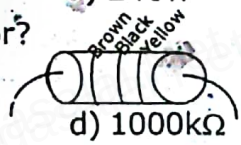
PART - A

Answer all the questions: **10×1=10**

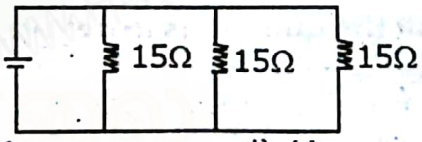
1. Which charge configuration produce a uniform electric field?
   a) point charge b) Infinite uniform line charge
   c) uniformly charged infinite plane d) uniformly charged spherical shell
2. Three capacitors are connected in triangle as shown in the figure. The equivalent capacitance between the points A and C is



   a) 1μF b) 2μF c) 3μF d) ¼μf
3. Which of the following quantity is a scalar?
   a) Electric force b) Electric field c) Electric potential d) Dipole moment
4. The unit of dipole moment is
   a) Cm^{-1} b) $C^{-1}m$ c) Cm d) NC^{-1}
5. A toaster operating at 240v has a resistance of 120Ω. The power is
   a) 400w b) 2w c) 480w d) 240w
6. What is the value of resistance of the following resistor?



   a) 100kΩ b) 10kΩ c) 1kΩ d) 1000kΩ
7. What is the current out of the battery?



   a) 1A b) 2A c) 3A d) 4A
8. A circular coil of radius 5cm and has 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is
   a) 1.0 amp-m^2 b) 1.2 amp - m^2 c) 0.5 amp - m^2 d) 0.8 amp -m^2
9. The value of horizontal component of Earth's magnetic field at equator is
   a) Minimum b) zero c) finite d) Maximum
10. A wire of length ℓ carries a current I along the y direction and magnetic field is given by $\vec{B} = \frac{B}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$. The magnitude of Lorentz force acting on the wire is
    a) $\sqrt{\frac{2}{3}}\,BI\ell$ b) $\sqrt{\frac{1}{3}}\,BI\ell$ c) $\sqrt{2}\,BI\ell$ d) $\sqrt{\frac{1}{2}}\,BI\ell$

PART - B

Answer any 5 questions. Question No.14 is compulsory: **5×2=10**

11. Define : "Electric dipole"
12. State Coulomb's law in electrostatics?
13. Mention the applications of capacitors?
14. Determine the number of electrons flowing per second through a conductor, when a current of 32A flows through it.
15. State the principle of potentiometre?
16. What is magnetic susceptibility?
17. Compare dia para and ferro magnetism?

PART - C

Answer any five questions. Question No.20 is compulsory: **5×3=15**

18. Derive an expression for electrostatic potential due to a point charge?
19. Obtain Gauss law from Coulomb's law?
20. A parallel plate capacitor has square plates of side 5cm and separated by a distance of 1 MM. Calculate the capacitance of this capacitor.
21. State Macroscopic form of Ohm's law.
22. State the application of seebeek effect.
23. Compute the torque experienced by a magnetic needle in a uniform magnet field?
24. Discuss the conversion of galvanometre in to an ammetre and also a volt meter.

PART - D

Answer all the questions in detail: **3×5=15**

25. a) Derive an expression for electrostatic potential due to an electric dipole?

(OR)

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

26. a) Explain in detail the construction and working of a Vande Graaft generator?

(OR)

b) Explain the equivalant resistance of a series and parallel resistor net work?

27. a) Deduce the relation for the magnetic induction at a point due to an infinity long straight conductor carring current.

(OR)

b) Discuss the working of cyclotron in detail?

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PART-A

1. c) $E = \frac{\sigma}{2\varepsilon_0}$ [does not contains r term]

2. $C_1 = 1\mu F$ $C_2 = 2\mu F$ $C_3 = 2\mu F$

C_2 & C_3 in series

$$\frac{1}{C_S} = \frac{1}{C_2} + \frac{1}{C_3}$$

$$= \frac{1}{2} + \frac{1}{2}$$

$C_S = 1\mu F$

$C_p = C_S + C_1$

$= 1 + 1$

$= 2\mu F$

b) $2\mu F$

3. c) Electric potential

4. c) cm $P = 2aq$
cm

5. c) 480W
$V = 240$ $R = 120\Omega$
$P = VI$ $I = \frac{V}{R}$
$= \frac{V^2}{R} = \frac{240 \times 240}{120} = 480\,W$

6) B - 1
Black - 0
yellow - 4
10×10^4
100×10^3
$100 k\Omega$
a) $100 k\Omega$

7)
$$\frac{1}{R} = \frac{1}{15} + \frac{1}{15} + \frac{1}{15}$$

$R = 5\Omega$

$V = 5V$

$I = \frac{V}{R} = \frac{5}{5}$

$I = 1A$

8) b) 1.2 amp - m^2

$P = IA$

$I = 3A$ $A = 1m^2$

$P = 1.2\,amp - m^2$

9. d) maximum

10) $F = Il \times B$ a) $\sqrt{\frac{2}{3}} BIl$.

$I \rightarrow$ y direction $i\hat{j}$

$Il = i\hat{j}l$

$Il \times B = \frac{B}{\sqrt{3}} (\hat{j}l) \times (\hat{i} + \hat{j} + \hat{k})$

$= \frac{BIl}{\sqrt{3}} (\hat{j} \times \hat{i} + \hat{j} \times \hat{j} + \hat{j} \times \hat{k})$

$= \frac{BIl}{\sqrt{3}} (-\hat{k} + 0 + \hat{i})$

$= \frac{BIl\sqrt{2}}{\sqrt{3}}$

PART - B

part - C

14. $I = 32A$ $n = ?$ $t = 1s$

$I = \frac{q}{t} = \frac{ne}{t}$

$32 = \frac{n \times 1.6 \times 10^{-19}}{1}$

$\frac{32}{1.6 \times 10^{-19}} = n$

$\frac{32}{1.6} \times 10^{19} = n$

$2 \times 10^{20} = n$

20. $d = 1mm = 1 \times 10^{-3}$

$a = 5 \times 10^{-2} m$

$C = \frac{\varepsilon_0 A}{d}$

$A = a^2 = 25 \times 10^{-4} m$

$C = \frac{8.854 \times 10^{-12} \times 25 \times 10^{-4}}{1 \times 10^{-3}}$

$= 221.35 \times 10^{-16} \times 10^{3}$

$C = 221.35 \times 10^{-13} F$