St. Mary's Convent School Gulaothi, U.P. (2026 – 27)

Set - B

MCQ PAPER

Class 12 **T.sign_____**

Physics **Time: 45 min.**

Max Marks:20

NAME:- TANISHA

Write name in capital letter

ROLL NO:- 16

General instructions

1.All question are compulsory.

2.Write neately and clearly in given space.

3.Do not cut or fill the circle given on upper and bottom of paper.

4.Write the answer of each question in the space provided

Write the option in capital letters only)

Section A : Write down the correct option for the given questions.

ANS 1: ab ✓ 0.5/0.5

ANS 2: b ✓ 0.5/0.5

ANS 3: b ✓ 0.5/0.5

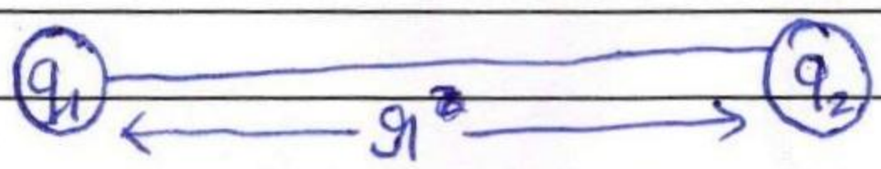
ANS 4: a ✓ 0.5/0.5

Page total: **2.0 von 2.0**

Section B Very Short Answer (2 × 1 = 2 marks)

ANS 5:

1.0 ✓



The force of attraction or repulsion between two charges is directly propotional to the magnitude of the charges and inversely propotinal ~~to~~ to the square of distance between them.

$$F \propto q_1 q_2$$

$$F \propto \frac{1}{r^2} \Rightarrow F \propto \frac{q_1 q_2}{r^2}$$

$$F = K \frac{q_1 q_2}{r^2}$$

ANS 6:

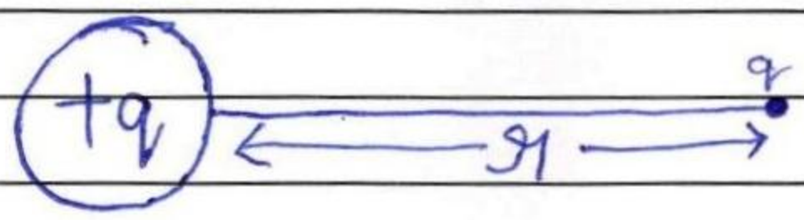
1.0 ✓

It is the work done by external agent to bring positive charge unit from infinity to the point without acceleration is called electric potential

$$V = \frac{W}{q_0}$$

Page total: **2.0** **von 2.0**

ANS 7:



Electric field due to two point charges

$$E = \frac{kqq}{r^2}$$

For point charge

$$F = \frac{E}{q_0}$$

$$= \frac{kqq_0}{r^2 q_0}$$

$$= \frac{kq}{r^2}$$

Marks	1.0
Teacher's feedback	You inverted the relation between force and field. It should be E = F/q0. Start with F = Kqq0/r^2 and divide by q0 to get E = Kq/r^2 (radially).

Page total: **1.0 von 2.0**

ANS 8:

Electric field due to $(-q)$ at point $P = \frac{Kq}{(r+l)^2}$

Electric field due $(+q)$ at point P

$$= \frac{Kq}{(r-l)^2}$$

$$= -\frac{Kq}{(r-l)^2} - \frac{Kq}{(r+l)^2}$$

$$= Kq\left[\frac{r^2+l^2+2rl - r^2-l^2+2rl}{(r^2-l^2)^2}\right]$$

$l \ll\ll r$

$$= Kq\left[\frac{4rl}{r^4}\right]$$

$$= \frac{2KPr}{r^4} = \frac{2KP}{r^3}$$

$r = 2a$

$$= \frac{2KP}{(2a)^3}$$

For Equitorial

$$= \frac{KP}{r^3}$$

$$= \frac{KP}{(2a)^3}$$

Marks	0.0
Teacher's feedback	The question asks for dipole moment: p = q(2a), directed from −q to +q. Your solution derives electric field instead and arbitrarily sets y = 2a. No field calculation needed; just state p = 2aq.

Page total: **0.0 von 2.0**

ANS 9:

$q = 2\mu C$

$r = 0.5m$

Electric flux through the sphere

$$= \frac{1}{4\pi\varepsilon_0} \frac{q}{r^2}$$

$$= 9 \times 10^9 \times \frac{2 \times 10^{-6}}{0.5}$$

$$= 9 \times 4 \times 10^3$$

$$= 36 \times 10^3 \ Nm^2/C^2$$

$$= \cancel{360 \ Nm^2/C^2}$$

Marks	0.0
Teacher's feedback	Used electric field instead of Gauss's law for flux; incorrect denominator and units. Correct approach: Φ = q/ε0 ≈ 2.26×10^5 N·m^2/C.

Page total: **0.0 von 2.0**

ANS 10:

$C = \frac{Q}{V}$; $V = \frac{Q}{C}$

$dw = V dQ$

$dw = \frac{Q}{C} dQ$

$\int dw = \int \frac{Q}{C} dQ$

$w = \frac{1}{C} \int Q dQ$

$w = \frac{1}{C} \frac{Q^2}{2}$

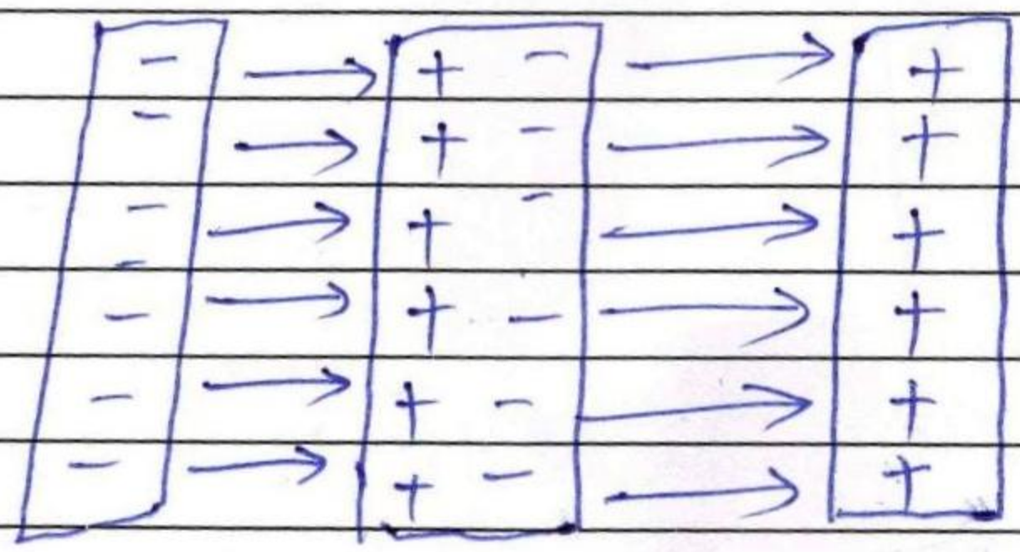
$W = \frac{1}{2} \frac{Q^2}{C}$

$U = \frac{1}{2} CV^2$

Marks	2.0
Teacher's feedback	Correct derivation and final expressions. For completeness, show integration limits from 0 to Q (and V from 0 to V) or note U = 1/2 QV as an equivalent form.

Page total: **2.0 von 2.0**

ANS 11:

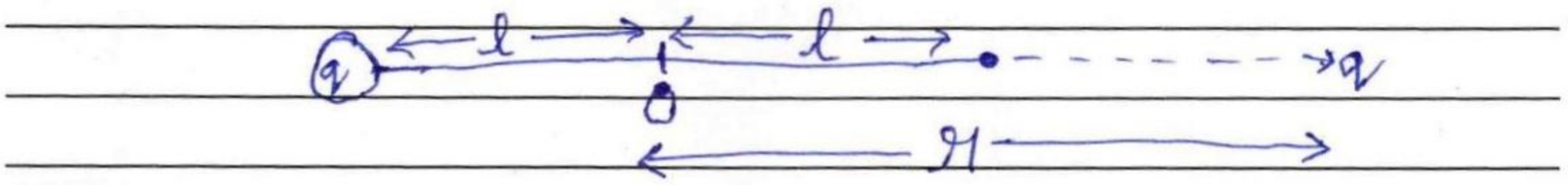


0.0 **von 2.0**

Marks	0.0
Teacher's feedback	The response does not explain the dielectric's effect. You should describe polarization, induced charges reducing the field and potential, and the resulting increase in capacitance: C = k ε0 A/d. Provide a clear explanation or proper diagram.

Page total:

ANS ~~13:~~ 12



Electric field due to (-q) at point P

$$= \frac{Kq}{r+l}$$

Electric field due to (+q) at point P

$$= \frac{Kq}{r-l}$$

Net

$$= E_q - E_q$$

$$= \frac{Kq}{r-l} - \frac{Kq}{r+l}$$

$$= Kq\left[\frac{1}{r-l} - \frac{1}{r+l}\right]$$

$$= Kq\left[\frac{r+l-r+l}{(r^2-l^2)}\right]$$

$l <<< r$.

$$= Kq\,\frac{2l}{r^2}$$

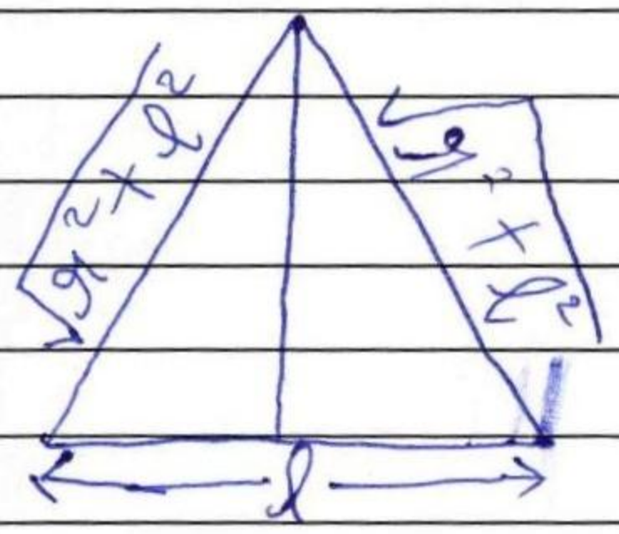
$$= \frac{K\,P}{r^2}.$$

For equatorial point

$$E_{-q} - E_{+q}$$

$$\frac{Kq/}{\sqrt{r^2+l^2}} - \frac{Kq/}{\sqrt{r^2+l^2}}$$

$$= 0$$



Marks	0.0
Teacher's feedback	Work is irrelevant to capacitor problem; you derived dipole field expressions. For a parallel-plate capacitor, C □ ε_r/d. Halving distance doubles C; inserting dielectric (κ=6) multiplies by 6. Correct answer: 96 pF.

Page total: **0.0 von 3.0**

ANS ~~12~~: 13

$$C = \frac{KA\varepsilon}{d}$$

$$C = \frac{K A \varepsilon_0}{d/2}$$

$$C = \frac{2\,K A \varepsilon}{d}$$

$C = 8pF$
dielectric
constant = 6.

Marks	0.0
Teacher's feedback	Your solution discusses capacitor formulas, not the electric dipole potential. Derivation should sum potentials of ±q separated by 2a, then approximate for r >> a to get V = (1/4πϵ0)(p cosθ)/r^2 with p = 2qa.

7.0/20.0

Usha Rani 04:49, 18.08.202(

Page total: 0.0 von 3.0