



INDIAN SCHOOL AL WADI AL KABIR

Class: XII	Department: SCIENCE 2020 – 2021 SUBJECT : PHYSICS	Date of submission: 10.05.2020
Worksheet No: 2	CHAPTER-2 – ELECTRIC POTENTIAL	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

QUESTIONS BASED ON BOARD PAPERS

SECTION A

Directions (Q1-Q5) Select the most appropriate option from those given below each question

[1] When charge is supplied to a conductor, its potential depends upon

- [a] amount of charge [b] geometry and size of the conductor [c] both [a]&[b]
[d] only on [a]

[2] The variation of potential V with r & electric field with r for a point charge is correctly shown in the graphs



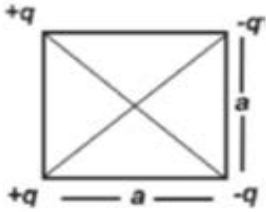
[3] A dipole is placed parallel to electric field .If W is the workdone in rotating the dipole from 0° to 60° ,then work done in rotating it from 0° to 180° is

- [a] $2W$ [b] $3W$ [c] $4W$ [d] $\frac{W}{2}$

[4] A parallel plate capacitor is charged by a battery .Once it is charged ,battery is removed. Now a dielectric material is inserted between the plates of the capacitor, which of the following does not change?

- [a] Electric field [b] potential difference [c.] charge on the plates [d] energy stored

[5] The potential at the centre of the square is



- [a] zero [b] $2kq$ [c] $\frac{kq}{a^2}$ [d] $\frac{kq}{2a^2}$

KEY

- [1]c [2] b[3] c[4]c [5]a

SECTION B[2 marks]

[6]A neutral hydrogen molecule has two protons and two electrons. If one of the electrons is removed, we get a hydrogen molecule ion (H_2^+). In the ground state of H_2^+ the protons are separated by roughly 1.5\AA and the electron is roughly 1\AA from each proton. Estimate the potential energy of the system.

$$U = \frac{Kq_1q_2}{r_{12}} + \frac{kq_2q_3}{r_{23}} + \frac{kq_3q_1}{r_{31}} = -19.2\text{eV}$$

[7]The electric field intensity at a point due to a point charge is 20 N/C and the electric potential is 10 J/C . Find the magnitude of the charge and distance of the point from charge.

$$V = \frac{KQ}{r}, E = V/d$$

$$Q = 0.55 \times 10^{-9}\text{ C}$$

[8]A capacitor with air between the plates has a capacitance of 8F .The separation between the plates is now reduced by half and the space between them is filled with a medium of dielectric constant 5 .Calculate the value of the capacitance of the capacitor in second case.

$$C = \frac{\epsilon_0 A}{d}$$

$$C^1 = \epsilon r \frac{\epsilon_0 A}{\frac{d}{2}}$$

$$C^1 = 80\text{F}$$

SECTION C[3 marks]

[9] A $4\mu\text{F}$ capacitor is charged by a 200 v supply.It is then disconnected from the supply and is connected to another $2\mu\text{F}$ capacitor. How much energy of the first capacitor is lost in the form of radiation?

$$E_1 = \frac{1}{2} C_1 V_1^2$$

$$E_2 = \frac{1}{2} C_p V^2$$

$$\text{Energy lost} = E_1 - E_2 = 2.67 \times 10^{-2} \text{ J}$$

[10] Derive the expression for capacitance of a parallel plate capacitor

[11] Derive the expression for energy stored in a capacitor

SECTION D [5 marks]

[12][a] Define electrostatic potential energy [b] Derive the expression for electrostatic potential energy of a system of 3 charges q_1 , q_2 and q_3

[13] What is an electric dipole. Derive an expression for electrostatic potential energy of an electric dipole in an external electric field of strength E

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