

(D) The work done by the external force in moving a unit positive charge from point A at potential V_A to point B at potential V_B is $(V_B - V_A)$.

EXERCISE - I

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|-----|---|-----|---|-----|---|-----|---------------|-----|---|-----|---|-----|---|
| 1. | B | 2. | C | 3. | D | 4. | C | 5. | A | 6. | C | 7. | B |
| 8. | A | 9. | A | 10. | C | 11. | A | 12. | D | 13. | D | 14. | B |
| 15. | A | 16. | C | 17. | A | 18. | A | 19. | D | 20. | A | 21. | B |
| 22. | B | 23. | D | 24. | C | 25. | (i) B, (ii) D | 26. | A | 27. | A | 28. | D |
| 29. | A | 30. | C | 31. | B | 32. | C | 33. | B | 34. | D | 35. | D |
| 36. | A | 37. | B | 38. | C | 39. | A | 40. | D | 41. | C | 42. | C |
| 43. | C | 44. | A | 45. | D | 46. | A | | | | | | |

EXERCISE - II

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|----|--------|-----|-------|-----|-----|-----|-------|----|-------|----|-------|----|---|----|--|
| 1. | C
D | 2. | A,C | 3. | C | 4. | C,D | 5. | A,B,C | 6. | A,B,C | 7. | D | 8. | |
| 9. | A,C,D | 10. | A,C,D | 11. | A,B | 12. | A,C,D | | | | | | | | |

EXERCISE - III

1. There is a positive charge in the close surface. 2. $\frac{q}{24\epsilon_0}$ 3. $a = \frac{R}{\sqrt{3}}$ 4. $\frac{Q}{2\epsilon_0}$ 5. $\frac{R\lambda}{2\epsilon_0}$
6. $\frac{1}{2\pi} \sqrt{\frac{qQ}{4\pi\epsilon_0 m R^3}}$ 7. $9V_0$

8. (i) $\left(\frac{r_1}{r_2}\right)q$ (ii) Charge on inner shell = $-\left(\frac{r_1}{r_2}\right)q$ and charge on the outer shell = q
- (iii) Charge flown in to the earth = $\left(\frac{r_1}{r_2}\right)q$
9. $v = \frac{kq}{r}$ 10. (i) $q_2 = -\frac{b}{a}q_1$; (ii) $V_r = \frac{q_1}{4\pi\epsilon_0} \left(\frac{1}{r} - \frac{1}{a}\right)$; $a \leq r \leq b$
11. $-Q/3$ 12. $1.125 q$
13. $V_2 = \frac{V_1 r_1}{r_2}$ 14. $(\sigma - x) A$, $x A$, $-x A$, $(x - 2\sigma) A$, where $x = (2\epsilon_0 E + 3\sigma) / 2$
9. $V_b = \frac{q_1}{4\pi\epsilon_0} \left(\frac{1}{b} - \frac{1}{a}\right)$; $r = b$
- $V_r = \frac{1}{4\pi\epsilon_0} \left(\frac{q_1}{r} + \frac{q_2}{r}\right)$; $r \geq b$

ANSWER KEY

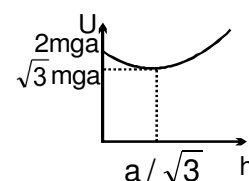
EXERCISE - IV

1. $\left[\frac{2KQq}{mR} \left(\frac{r-R}{r} + \frac{3}{8}\right)\right]^{1/2}$ 2. $\sqrt{\frac{6\sqrt{2}mr\epsilon_0}{epa}}$ 3. 0, $\frac{2K\lambda}{r}$, 0 4.
5. $7.5 \times 10^{-9} \text{ N}$ 6. $\frac{Qq}{2\pi\epsilon_0 L}$ 7. 2

ANSWER KEY

EXERCISE - V

1. C 2. (a) $U_2 = \frac{a^2 Q^2}{8\pi\epsilon_0 R} \left(\frac{1-a^n}{1-a}\right)^2$ where $a = \frac{R}{r+R}$, (b) $U_2 (n \rightarrow \infty) = \frac{RQ^2}{8\pi\epsilon_0 r^2}$
3. (i) C, (ii) (a) $H = \frac{4a}{3}$, (b) $U = mg \left[2\sqrt{h^2 + a^2} - h\right]$ equilibrium at $h = \frac{a}{\sqrt{3}}$,



4. A 5. C 6. $V' = \left(\frac{a}{3t}\right)^{1/3} \cdot V$ 7. A,B,C,D 8. A 9. D
10. B 11. B 12. A 13. B 14. C 15. B 16. 2
17. A 18. A 19. C 20. A,B,C,D 21. C, D