

## Answers

### **MCQ**

**Uniform Electric Field (1-5)** D D C D A

**Electric Force and Field due to Point Charges (6-10)** A B B B C

**Motion of Charged Particles in Electric Fields (11-15)** C D A A C

### **Structured Questions**

16 (a)  $2.0 \times 10^6 \text{ N C}^{-1}$

(b) 4.0 N, upwards

(c) 10.5 N, downwards

17  $-2.3 \times 10^{-4} \text{ C}$

18 (a) Yes.

If sphere 2 was more massive, then  $\vartheta > \phi$ .

(b)  $\sqrt[3]{\frac{2kLQ_1Q_2}{mg}}$

19 10 mm from the  $-0.20 \text{ nC}$  charge

20  $61.3^\circ$

21  $3.2 \times 10^6 \text{ m s}^{-1}$

22 (a)  $2.5 \times 10^{15} \text{ m s}^{-2}$ , upwards

(b)  $2.4 \times 10^{-9} \text{ s}$

(c) Exit the region (vertical displacement =  $0.0071 \text{ m} < 0.0075 \text{ m}$ )

23 (a) (i)  $4.5 \times 10^{-9} \text{ s}$

(ii)  $8.8 \times 10^{13} \text{ m s}^{-2}$

(iii)  $4.0 \times 10^5 \text{ m s}^{-1}$

(b)  $1.71^\circ$

(c)  $6.8 \times 10^{-3} \text{ m}$