

Module 1 Development of practical skills in physics ✓

2

Module 2 Foundations of physics

6

Chapter 2

8

- 2.1 Quantities and units 8
- 2.2 Derived units ✓ 10
- 2.3 Scalar and vector quantities 12
- 2.4 Adding vectors ✓ 14
- 2.5 Resolving vectors ✓ 16
- 2.6 More on vectors 18

Module 3 Forces and motion

20

Chapter 3 Motion

22

- 3.1 Distance and speed ✓ 22
- 3.2 Displacement and velocity ✓ 24
- 3.3 Acceleration 27
- 3.4 More on velocity–time graphs 29
- 3.5 Equations of motion 31
- 3.6 Car stopping distances 35
- 3.7 Free fall and g 37
- 3.8 Projectile motion ✓ 40
- Practice questions 44

Chapter 4 Forces in action

46

- 4.1 Force, mass, and weight 46
- 4.2 Centre of mass 49
- 4.3 Free-body diagrams 51
- 4.4 Drag and terminal velocity 54
- 4.5 Moments and equilibrium ✓ 57
- 4.6 Couples and torques ✓ 60
- 4.7 Triangle of forces 62
- 4.8 Density and pressure 65
- 4.9 $\rho = h\rho g$ and Archimedes' principle ✓ 67
- Practice questions 70

Chapter 5 Work, energy, and power

72

- 5.1 Work done and energy ✓ 72
- 5.2 Conservation of energy 74

- 5.3 Kinetic energy and gravitational potential energy ✓ 76

- 5.4 Power and efficiency 79
- Practice questions 82

Chapter 6 Materials

84

- 6.1 Springs and Hooke's law 84
- 6.2 Elastic potential energy ✓ 88
- 6.3 Deforming materials 90
- 6.4 Stress-strain, and the Young modulus ✓ 92
- Practice questions 97

Chapter 7 Laws of motion and momentum

100

- 7.1 Newton's first and third laws of motion 100
- 7.2 Linear momentum ✓ 102
- 7.3 Newton's second law of motion ✓ 105
- 7.4 Impulse ✓ 107
- 7.5 Collisions in two dimensions 109
- Practice questions 111
- Module 3 summary 114
- Module 3 practice questions 116

Module 4 Electrons, waves, and photons

120

Chapter 8 Charge and current

122

- 8.1 Current and charge 122
- 8.2 Moving charges 126
- 8.3 Kirchhoff's first law 129
- 8.4 Mean drift velocity ✓ 131
- Practice questions 135

Chapter 9 Energy, power, and resistance

138

- 9.1 Circuit symbols 138
- 9.2 Potential difference and electromotive force 140
- 9.3 The electron gun 143
- 9.4 Resistance 145
- 9.5 I - V characteristics 148
- 9.6 Diodes 151
- 9.7 Resistance and resistivity 153

- 9.8 The thermistor ✓
- 9.9 The LDR
- 9.10 Electrical energy and power ✓
- 9.11 Paying for electricity
- Practice questions

Chapter 10 Electrical circuits

- 10.1 Kirchhoff's laws and circuits
- 10.2 Combining resistors ✓
- 10.3 Analysing circuits
- 10.4 Internal resistance ✓
- 10.5 Potential divider circuits ✓
- 10.6 Sensing circuits ✓✓
- Practice questions

Chapter 11 Waves 1

- 11.1 Progressive waves
- 11.2 Wave properties
- 11.3 Reflection and refraction
- 11.4 Diffraction and polarisation
- 11.5 Intensity ✓✓
- 11.6 Electromagnetic waves ✓
- 11.7 Polarisation of electromagnetic waves
- 11.8 Refractive index ✓
- 11.9 Total internal reflection
- Practice questions

Chapter 12 Waves 2

- 12.1 Superposition of waves ✓
- 12.2 Interference ✓
- 12.3 The Young double-slit experiment
- 12.4 Stationary waves ✓
- 12.5 Harmonics
- 12.6 Stationary waves in air columns
- Practice questions

Chapter 13 Quantum physics

- 13.1 The photon model
- 13.2 The photoelectric effect ✓✓
- 13.3 Einstein's photoelectric effect equation ✓
- 13.4 Wave–particle duality ✓
- Practice questions
- Module 4 summary
- Module 4 practice questions