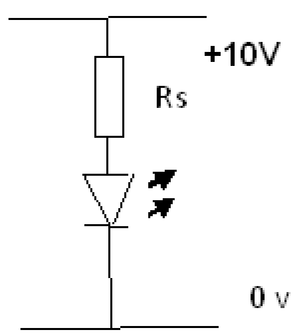
Question	Syllabus reference	Question	Marks
1 Marking guide / answer	01.01	a) i) Tesla. ii) Newton. iii) Henry. b) i) Megavolt ii) Microvolt.	1 mark each 1 mark each (Total 5)
2 Marking guide / answer	01.02	a) Directly Inversely b) i) 75 V ii) 3 A iii) 60 Ω	1 mark each 1 mark each (Total 5)
3 Marking guide / answer	01.02	a) Current through R2 = 10/20 = 0.5 A. Being a series circuit the total circuit current is also 0.5 A. b) Voltage across R1 is 50 – 10 = 40 V. c) R1 = 40/0.5 = 80 Ω.	2 1 1 (Total 4)
4 Marking guide / answer	01.02	a) Using R1's details, supply voltage = 2 x 5 = 10 V b) I2 = 10/3 = 3.33 A c) Total resistance = $\frac{5 \times 3}{5+3}$ = 1.875 Ω	2 2 2 (Total 6)
5 Marking guide / answer	01.02	a) Power = I^2R = 0.0625 x 55 = 3.437 Watts b) Energy = power x time (secs) = 3.437 x 30 = 103.11 Joules	2 3 (Total 5)
6	02.01	a)	

Marking guide / answer		i) No current would flow through the solenoid, so no magnetic field would be created and no activity would occur. ii) Current would flow through the solenoid creating a magnetic field, which would attract the lever closing the contact. b) i) Autotransformer. ii) An autotransformer has not got independent primary and secondary windings, whereas a double wound type has. iii) The tapped connections cater for the selection of various secondary output voltages. c) Description similar to the following. i) As a switch the transistor can be turned on by a small control signal, resulting in a larger conduction path to switch on some other device. ii) As an amplifier, the transistor will have a small input signal and would create a much larger version of that signal at its output. d) i) The magnetic field that induces an EMF into the rotating armature. ii) The armature is the rotating coil(s) within the magnetic field that has induced into it a generated voltage. iii) The slip rings form the connection method from the armature which is rotating. e) 	1 3 1 2 1 2 2 1 2 1 1 mark for correct polarity. 1 mark for correct LED symbol. 2 marks for circuit including a series resistor. (Total 20)
7 Marking	02.02	a) The current supplied by a computer port is **not**	

guide / answer		sufficient to drive a typical dc motor. b) i) The bi-polar transistor uses the small computer port current to forward bias the base emitter junction to initiate the process. ii) The transistor amplifies the base emitter current to produce a collector current which is sufficient to drive the motor.	1 2 2 (Total 5)
8 Marking guide / answer	02.02	a) Diagram should show a primary winding connected to the 230 V ac supply and the secondary winding providing the 100 V ac output. b) The turns ratio of the transformer is 2.3:1. c) Description should refer to the fact that isolation is achieved because the secondary is not referenced to earth, reducing the possibility of electric shock.	2 1 2 (Total 5)
9 Marking guide / answer	03.01	a) 60 / 85 = 0.7058 A b) R2 resistance = 35 VR2 = 0.7058 x 35 = 24.7 volts c) R1 + R2 = 55 VR1/2 = 0.7058 x 55 = 38.8 volts (Allow full follow through marks if part a) has been incorrectly calculated).	2 2 3 (Total 7)
10 Marking guide / answer	03.01	a) i) $I = \frac{V}{R}$ = 60/50 = 1.2 A ii) $I = \frac{V}{R}$ = 60/65 = 0.923 A iii) IT = 3.5 A so current through R3 = 3.5 – 2.123 = 1.377 A b) $R2 = \frac{V}{I} = \frac{60}{1.377}$ = 43.57 ohms	2 2 2 2 (Total 8)
11 Marking	03.02	a) N S	1

guide / answer		b) N N c) S S	2 2 (Total 5)
12 Marking guide / answer	03.03	a) North (N). b) Clockwise.	2 3 (Total 5)
13 Marking guide / answer	03.04	a) Two polarised conductive plates, separated by an electrolyte. b) Conductive plates with no inserted dielectric material. c) Two non-polarised conductive layers and two dielectric layers.	2 1 2 (Total 5)
14 Marking guide / answer	03.05	Correct sketch indicating: a) One complete cycle b) Peak-to-peak value. c) Root mean square value (0.707)	2 1 2 (Total 5)
15 Marking guide / answer	03.06	a) Step down voltage ratio = 2:1 so, voltage at A = 50 volts. b) Step up voltage is from 50 volts to 300 volts, so turns ratio = 1:6.	2 3 (Total 5)
16 Marking guide / answer	03.07	a) Full wave rectification is achieved because conduction in one direction, to the load, will take place on both positive and negative input ac half cycles. b) Smoothing is achieved by connecting a capacitor across the output.	3 2 (Total 5)

			Total marks	**100**