2009 HSC Electrotechnology
Sample Answers

This document contains 'sample answers', or, in the case of some questions, 'answer may include'. These are developed by the examination committee for two purposes. The committee does this:

(a) as part of the development of the examination paper to ensure the questions will effectively assess students' knowledge and skills, and

(b) in order to provide some advice to the Supervisor of Marking about the nature and scope of the responses expected of students.

The 'sample answers' or similar advice, are not intended to be exemplary or even complete responses. They have been reproduced in their original form as part of the examination committee's 'working document'. While the handwritten notes have been typed for legibility, no further editorial change or addition has occurred.

Section II

Question 16 (a)

Sample answer:

Fuse

Question 16 (b)

Sample answer:

Variable Resistor, Rheostat, Potentiometer, POT

Question 16 (c)

Sample answer:

Double Insulated

Question 17 (a)

Sample answer/Answers could include:

$V = IR$ $E = IR$

$I = \frac{V}{R}$ $I = \frac{E}{R}$

$R = \frac{V}{I}$ $R = \frac{E}{I}$

Question 17 (b)

Sample answer/Answers could include:

$$I = \frac{V}{R}$$

$$= \frac{25}{10} \quad = 2.5 \text{ A}$$

Question 18 (a)

Sample answer/Answers could include:

Band 1 Blue
Band 2 Grey
Band 3 Brown
Band 4 Brown

Question 18 (b)

Sample answer:

20 MΩ 5%
Tolerance Value 1 MΩ
21 MΩ

Question 19 (a) (i)

Sample answer:

(A) Battery

Question 19 (a) (ii)

Sample answer/Answers could include:

(B) Lamp, Indication light-reference to light or lamp (NOT LED)

Question 19 (b)

Sample answer/Answers could include:

- Current flows
- Light on

Question 19 (c)

Sample answer/Answers could include:

- Short circuit
- Fuse blown
- Light out

Question 20 (a)

Sample answer/Answers could include:

$T = RC$

$= 15\text{K} \times 47\ \mu\text{F}$

$= .705\ \text{sec} \quad or \quad 705\ \text{mSec}$

Question 20 (b)

Sample answer/Answers could include:

$$I = \frac{V}{R}$$

$$= \frac{100}{15\text{K}} \qquad = 6.67\ \text{mA}$$

Question 20 (c)

Sample answer/Answers could include:

$$R = \frac{T}{C}$$

$$= \frac{1}{47 \times 10^{-6}}$$

$$= 21.276\ \text{K}$$

$21.276\ \text{K} -$

$$\frac{15 \quad k}{6276\ \Omega}$$

Question 21 (a)

Sample answer/Answers could include:

- Pop rivet pliers, pop rivet gun, pop rivet tool → fixing pop rivets

Question 21 (b)

Sample answer/Answers could include:

- Combination pliers, electricians pliers →holding, cutting wire, gripping, twisting and stripping wire

Question 22 (a)

Sample answer/Answers could include:

- Moving a conductor through a magnetic field
- Moving a magnetic field along a conductor

Question 22 (b)

Answers could include:

- Geothermal
- Wind
- Tidal
- Hydro

Answers must NOT include:

- Solar
- Coal/Fossil fuels
- Nuclear

Question 23

Answers should include:

- Correct KΩ range
- Zero adjustment after range selection
- Check meter operational (0Ω, ∞Ω)
- Recognition of parallax error

Question 24

Sample answer/Answers could include:

$$\left.\begin{aligned} R2 + R3 &= 12 + 52 = 64\ \Omega \\ R4 + R5 &= 40 + 33 = 73\ \Omega \end{aligned}\right\} \text{ Series}$$

$$\left.R_p = \frac{R23 \times R45}{R23 + R45} = \frac{64 \times 73}{64 + 73} = 34.1\ \Omega\right\} \text{ Parallel}$$

$$\mathrm{R}_p = \frac{1}{\frac{1}{64} + \frac{1}{73}} = 34.1\ \Omega$$

$$\left.\begin{aligned} R_T &= R_1 + R_p + R_6 \\ &= 24 + 34.1 + 27 \\ &= 85.1\ \Omega \end{aligned}\right\} \text{Series}$$

Section III

Question 25

Sample answer/Answers could include:

- List of equipment required
  - Voltmeter (testing tool)
  - Hand tools
  - PPE

- List of procedure
  - Assess the need to isolate the equipment and your ability to safely perform the isolation
  - Notify all people affected by the work OR get authority to isolate the circuit
  - Determine the best method of isolating the supply
  - Test testing tools on known active supply
  - Test for presence of supply
  - Safely isolate supply
  - Place danger tag in the isolation switch AND lock switch off
  - Test the supply is isolated from equipment
  - Test equipment on known active supply
  - Physically isolate equipment
  - Make safe disconnected cable

Question 26

Sample answer/Answers could include:

- List of tools required including:
  - Rule
  - Scribe
  - Punch
  - Hammer
  - Drilling machine
  - 8.5 mm / 9.0 mm drill BIT
  - Tap handle
  - M10 × 1.5 taper / inter / plug tap
  - Thread cutting lubricant
  - Vice
  - Square
  - PPE

- List of procedure for process including:
  - Mark out material (rule and scribe – punch and hammer)
  - Drill hole 8.5 / 9.0 mm ∅ >15 <50 deep (PPE)
  - Remove swarf
  - Vice material
  - Lube taper tap, begin tapping operation, using square to ensure thread squareness
  - Remove swarf
  - Repeat process for inter and plug tap

Question 27

Sample answer/Answers could include:

- Actions and tasks to be undertaken:
  - Pacify customer
  - Listen to customers concerns, noting areas relevant to fault and its cause
  - Provide appropriate, accurate reassuring responses
  - Identify systems of problem
  - Keep customer updated with progress of fault diagnosis and ratification
  - Follow relevant appropriate OHS practices
  - Isolation procedures
  - Safe working area
  - Progressively test equipment and wiring in affected areas
  - Record and report findings to supervisor and customer
  - Either obtain clearance to repair immediately OR obtain date for the repairs to be made from supervisor
  - Relay this information to customer