Government of Western Australia
North Metropolitan TAFE

Portfolio Assessment tool Marking Guide

Qualification national code and title	**UEE30811 - Certificate III in Electrotechnology: Electrician**
Unit/s national code/s and title/s	**UEENEEG033A – Solve problems in single and three phase low voltage electrical apparatus and circuits - Heating**

Portfolio Assessment Solve problems in single and three phase low voltage electrical apparatus and circuits G033A Heating			
Lecturer Name			
Student Name			
Student ID Number			
Telephone Contact Number		**Email:**	
By completing and submitting this signed form to my lecturer, I am stating that: **a.** The attached submission is completely my own work **b.** I understand a copy of my assessment will be kept by the NMTAFE for their records **c.** I understand my assessment may be selected for use in the NMTAFE's validation and audit process to ensure student assessment meets requirements			
Student Signature		**Date**	
Due Date		**Time**	

Assessment Result Satisfactory / Not Yet Satisfactory *(please circle)* **Date:**_____

In order to satisfy requirements for this assessment, you need to complete the following:

Feedback to student:

Assessor please note: Where verbal clarification has been sought from a student to gather additional assessment evidence from an assessment item, question/s and response/s must be recorded, signed, and dated by the assessor, against the relevant assessment item/s.

Student Feedback

Feedback from student:

Lecturer Signature: _____ **Student Signature:** _____

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Assessment type (☑):

☐ Questioning (Oral/Written)
☐ Practical Demonstration
☐ 3rd Party Report
☒ Other – Project/Portfolio (*please specify)*

Assessment Resources:

Students will need access to:

Writing Instruments
Three Heat Switch panel

Assessment Instructions:

Assessor instructions

1. Student to answer all portfolio question by due date.

2. The assessor is to sign and record the students result as ***satisfactory*** or ***not yet satisfactory*** at the end of the assessment.

Student instructions

1. *Complete all portfolio questions by the due date given to you by your lecturer.*

2. ***Failure to submit by due date will result in a re-enrol for this unit.***

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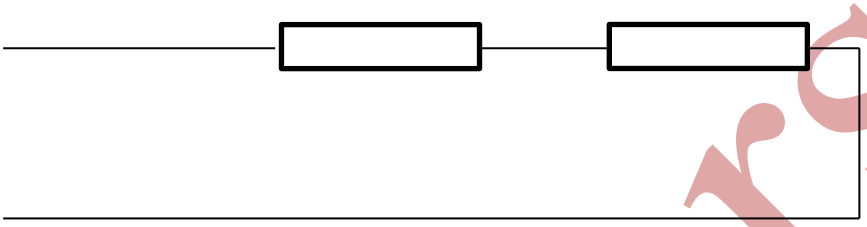
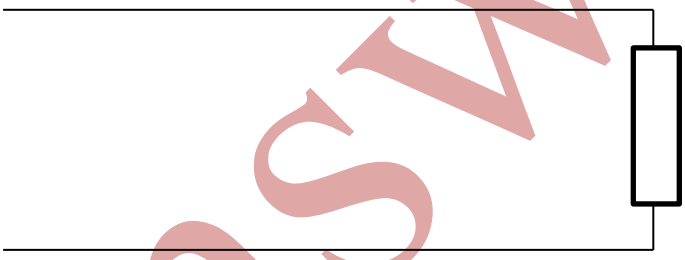
1. In the spaces provided below, sketch a **full circuit diagram** (including the elements) demonstrating how a "Three-Heat" switch achieves each of its 3 different heat settings.

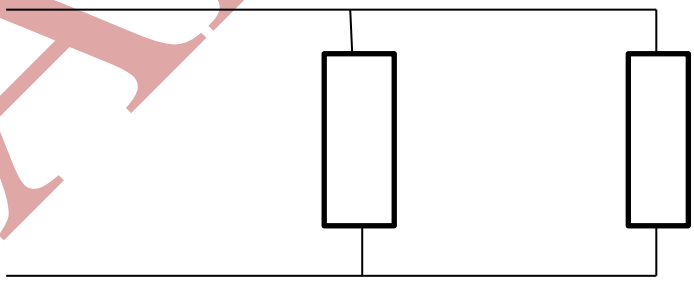
Low



Medium



High



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2. Calculate the **3 different wattage outputs and combined resistance values** derived from a three heat switch controlling a single-phase 240 volt stove top grill that consists of two 1 kW elements. Please **show** working.

Low

P = V I = I = P / V 1000/ 240 = 4.17A
R = V / I 240 / 4.17 57.6Ω for 1 element
2 elements in series = R_T = R_1 + R_2 = 115.2Ω
P = V^2 / R = 240^2 / 115.2 = 500W

115.2 Ω 500 W

Medium

R = V / I 240 / 4.17 57.6Ω for 1 element

57.6 Ω 1000 W

High

R_T^{-1} = R_1^{-1} + R_2^{-1} or x/+

= 3317.76 / 115.2 = 28.8Ω

P = V^2 / R = 57600/ 28.8 = 2000W

28.8 Ω 2000 W

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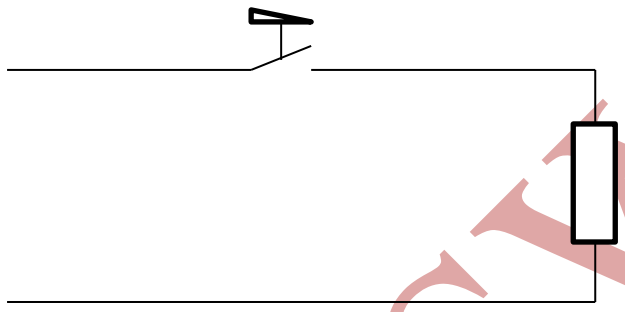
3. Explain how a simmer-stat controller works.

A simmer-stat incorporates a bi-metal strip which when heated by an internal element bends and causes the contacts to open. This cuts the supply to the elements and the internal heater. The bi-metal strip straightens out after a period of time switching on the element and the internal element. The overall temperature is governed by the size of the element and the time between on and off cycles. This cycle is controlled by rotating the dial which moves the contacts in such a way that the bi-metal strip has to bend more or less to operate the contacts.

4. Draw a circuit diagram of a simmer-stat controlling a hot water urn



5. Is a simmer-stat suitable for use in controlling an oven?

YES **NO** (Circle correct answer)

Explain your answer.

A simmer-stat does not provide temperature feedback so therefore it cannot control the actual temperature in the oven.

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6. Explain the principle of a “vapour (capillary) tube” type thermostat and list one application?

The capillary tube thermostat has a bulb which is located in the space where the temperature is required to be controlled. When heated the vapour or liquid in the bulb expands and travels up along the tube into the head unit where it operates a bellows. The bellows expands at a slower rate which can operate a set of contacts controlling the oven element. When the set temperature is reached the contacts are opened by the operation of the bellows. When the oven cools sufficiently the contacts close and the supply is again connected to the element used to re-heat the space again.

Application: Ovens, hot water systems

7. What precautions are necessary when handling and installing “vapour” controlled thermostats?

The tube must not get kinked or bent with too tight a radius otherwise it may restrict or hole the tube preventing the effective operation of the bellows inside the head unit

8. Give two applications of where a “fixed temperature” thermostat is an essential component which ensures that the device operates safety and as intended.

Hot water systems hair dryers, kettles etc

9. State the dangerous situation that may arise if the “Over-temperature” thermostat on a Hot Water System was to be bridged out.

The tank may explode or occupants may be scalded with boiling water should the operating thermostat fail in the on position

10. If a “Simmer-stat” should become faulty; in which state/s are they most likely to fail?

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ON OFF HALF ON/ HALF OFF (Circle the correct answer/s)

There is a special requirement in the "Wiring Rules" to reduce the danger posed by a failed Simmer-stat, what is this requirement?

Simmer-stats are often used to control the hot plates of an open cooking surface such as a range or hot plate in a kitchen. The rule states that there must be a way of effectively isolating the cook top should it be necessary. The switch must be labelled and readily accessible without the need to reach over the cooking surface to operate the switch. It must also be located adjacent to the cooking surface. It must switch ALL live active and neutral conductors.

Provide the AS/NZS3000 clause number 4.7.1

11. Define 'HEAT'.

The energy contained within a body or molecule that can move through the body or molecule.

12. Define 'TEMPERATURE'.

The measure of level of heat

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13. State the three different types of 'HEAT ENERGY TRANSFER'.

Radiation

Convection

Conduction

14. State three different Control methods of HEATING Appliances

Manual

Thermostatic

Duty cycle

15. State two different methods of 'MANUAL HEATING CONTROL'

Three Heat switch

On/ off

16. List three different types of 'Thermostats"

Strut & tube thermostat

Capillary tube thermostat

Helix bi-metal thermostat

END OF ASSESSMENT