energysafe VICTORIA Creating a safer state with electricity and gas

LICENSED ELECTRICIANS ASSESSMENT (LEA)

Licensed Electricians Theory Assessment

Sample Paper 1 (2019)

Surname: _____

Given Names: _____

Date: _____

- **PERSONAL NOTEPADS AND PAPER ARE NOT PERMITTED**
- **ONLY PENS MAY BE USED**
- **DO NOT REMOVE ANY SHEETS FROM THIS ASSESSMENT PAPER**
- **PAPERS WITH NO NAME OR SIGNATURE WILL NOT BE MARKED**
- **UNITS AND CALCUATIONS MUST BE SHOWN TO OBTAIN FULL MARKS**

The following reference books (including amendments) are permitted during the assessment session:

AS/NZS 3000:2018 Wiring Rules

AS/NZS3012: 2010 Electrical Installations – Construction and Demolition Sites

AS/NZS 3008.1.1:2017 Electrical Installations – Selection of Cables

AS/NZS 4836:2011 Safe working on or near low voltage electrical installations and equipment

Electricity Safety (Installations) Regulations 2009

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL
Marks																			

Candidates need to obtain 75% or more to pass this assessment.

Reading Time: 15 Minutes
Working Time: 2 hours

At the end of this time you will be asked to stop.

Candidate Signature: _____

Assessors Signature: _____

AS/NZS 3000 WIRING RULES

In the following **four** Wiring Rules questions, you are required to:

- write the Wiring Rules Clause and/or Table number in the space provided
- the correct Wiring Rules Clause and Subclause must be given e.g. 3.5.2(b)(i)

The correct answer to both parts must be given to obtain full marks.

Q 1.
What type of work is a 'repair'?

.....

……

……

……

Wiring Rules Clause number..... [2 + 2 = 4 Marks]

Q 2.
Where the presence of flora is expected to constitute a hazard to a wiring system, the wiring system shall be selected accordingly, or …….

.....

.....

Wiring Rules Clause number..... [2 + 2 = 4 Marks]

Q 3.

Is a 0.7µF capacitor required to be provided with a discharge path?

.....

.....

Wiring Rules Clause number.....
[2 + 2 = 4 Marks]

Q 4.

An installation has a substation on the premises, dedicated to that installation. The point of supply is the low voltage terminals of the substation. What is the permissible voltage drop for this installation?

.....

Wiring Rules Clause number.....

[2 + 2 = 4 Marks]

AS/NZS 3012 CONSTRUCTION & DEMOLITION SITES

In the following **two** AS/NZS 3012 questions, you are required to:

- write the Standard's Clause number and/or Table number in the space provided
- the correct Clause and Sub-clause number must be given. e.g. 2.10.2 (f)

The correct answer to both parts must be given to obtain full marks.

Q 5.
A flexible cord is supplying a Portable Socket Outlet Assembly (PSOA). What is the maximum length of the flexible cord?

……

……

Standard Clause number…….

[2 + 2 = 4 Marks]

Q 6.
When a visual inspection of construction wiring identifies damage, that part of the installation shall be ……..

.....

……..

.....

Standard Clause number..... [1+1+1+1= 4 Marks]

ELECTRICITY SAFETY (INSTALLATIONS) REGULATIONS 2009

In the following Regulation question, you are required to:
* write your answers on the line/s below each question
* write the complete Regulation and Sub-Regulation number, if applicable, in the space provided. e.g. 401 (e) (3)

The correct answer to parts and must be given to obtain full marks.

Q 7.

An electrical installation that is supplied from an underground electric line must have protective equipment provided at the point of supply, or …….

……..

.....

……..

……..

Regulation number..... [2 + 2 = 4 Marks]

ELECTRIC SHOCK SURVIVAL

Q 8.

A person is unconscious and breathing. The site is safe, but no one has gone for help. State two actions you should take.

1. .....

2. ……...

[2 + 2 = 4 Marks]

CABLE SELECTION

Q 9.

TWO three-core V90 insulated and sheathed copper cables, including earthing conductors, are connected in parallel to supply a three-phase distribution board with a total maximum demand of 200A.

The cables are spaced 0.15m apart and protected by a circuit breaker and installed buried direct at a depth of 0.8m.

(i) Neglecting voltage drop, what is the minimum cable size which can be installed for this circuit

(ii) If the cables were touching instead of spaced, what is the minimum cable size which can be installed for this circuit?

Table details, calculations and units must be shown to obtain full marks.

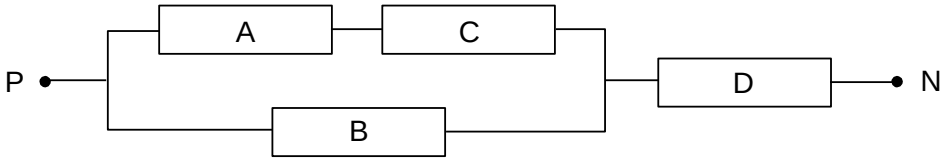
(i) Answer.....

(ii) Answer.....

]2+2+1+1+1+1 = 8 Marks]

DC CIRCUITS

Q 10.



The following values apply to the diagram above -

The total current in the circuit is 10A

A is 30Ω ; B is 5A ; C is 150V and D is 1000W .

Calculate:

(i) the current flowing through resistor C
(ii) the total voltage in the circuit
(iii) the total power dissipated by the circuit

All calculations must be shown to obtain full marks

Answers: (i) Current …… (ii) Voltage …..…… (iii) Power .....

[2+2+2 = 6 Marks]

MAXIMUM DEMAND

Q 11.

Calculate the Maximum Demand of a 230V sub-main supplying a distribution board in a air conditioned shop.

The load connected to the switchboard is:-

- 3 circuits of 8 - 10A single socket outlets
- 2 circuits of 2 - 15A socket outlets
- 3 circuits of 16 – incandescent lighting points.
- 1 – 4kW air conditioner
- 1 – 3.6kW cooker

All relevant Table details, including table and column and load groups used. Calculations and units must be shown to obtain full marks.

Answer.....

[1+2+2+2+1 = 8 Marks]

VOLTAGE DROP

Q 12.

In a 400/230V, three-phase industrial installation, a three-phase power factor corrected 17A motor which operates continuously is supplied from a sub-circuit originating at a distribution board.

All the cables are:-

- V90 multi-core insulated and sheathed cables with circular copper conductors
- protected by circuit breakers
- not installed with other cables

The circuit details are:-

Consumer Mains	MD current	73A
	Length	20m
	Size	35mm^2
Sub-mains	MD current	45A
	Length	40m
	Size	25mm^2
Final sub-circuit	Length	35m
	Size	10mm^2

The Consumer Mains and Sub-mains are operating at their normal operating temperatures.
The final sub-circuit cables have an operating temperature of 60^{o}C

Calculate the total voltage drop from the point of supply to the motor terminals.

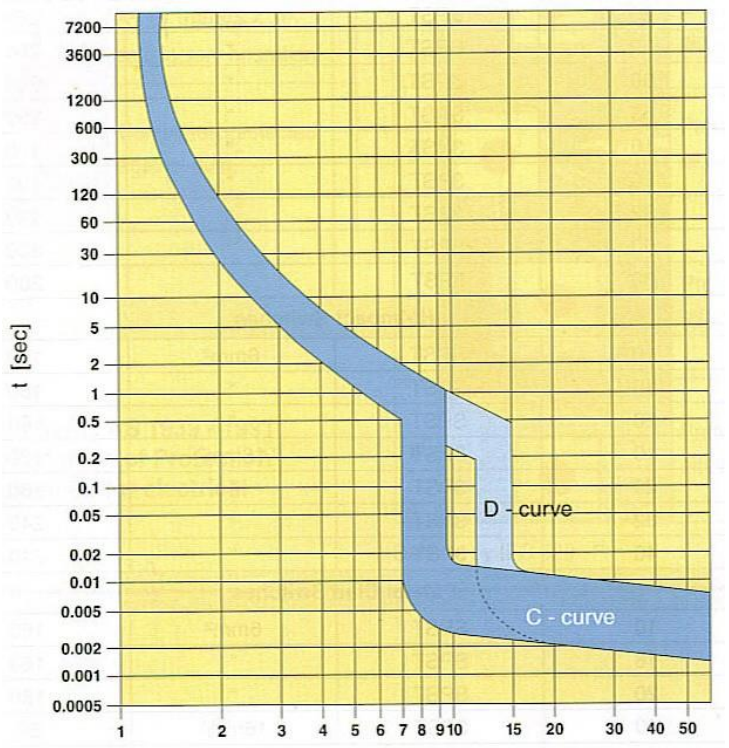
All relevant table details, calculations and units must be show to obtain full marks

Answer: ……

[3+3+3+1 = 10 marks]

OVERLOAD & SHORT CIRCUIT CALCULATIONS

Q 13.
What are the minimum and maximum tripping times for a 40A Type C miniature over-current circuit breaker which is subjected to an over-current of 120A?



Overcurrent divided by MCB current rating……

Answer: Minimum time..... Maximum time.....

[1+1+1 = 3 Marks]

OVERLOAD & SHORT CIRCUIT CALCULATIONS

Q 14.
The main switchboard of a 400/230V industrial installation is directly supplied from a 400KVA transformer which has a prospective fault current of 15,550A per phase.

Submains supply a distribution board from the main switchboard.

The following information is known:-

Impedance of the Consumer Mains = 0.0075Ω
Impedance of the Submains cables = 0.043Ω

Determine the prospective fault current at:-

(i) the main switchboard; and
(ii) the distribution board.

Work impedances to 5 decimal places.

All calculations must be shown to obtain full marks.

Transformer Impedance …….....

MainSw/Bd …….....

Dist/Bd …….....

[3+3+3 = 9 Marks]

RESIDUAL CURRENT DEVICES

Q 15.

A 30mA Residual Current Device is to be installed to protect two (2) circuits of 10A socket outlets with an MD of 30A. Each circuit is protected by a 20A circuit breaker.

State the minimum current rating of the Residual Current Device.

……

[3 Marks]

MOTORS AND STARTERS

Q 16.

CIRCLE the letter in front of the statement you consider to be the most correct.

On start up, a 3 phase 400V squirrel cage induction motor with an automatic star/delta starter:-

A starts on half the line voltage (200V).
B changes to delta connection at about 80% of the motor's full rated speed.
C has a starting torque three times that of the DOL starting torque.
D has a starting current one half of the DOL current.

[2 Marks]

AS/NZS 4836:2011

Q 17.
This question relates to AS/NZS 4836:2011

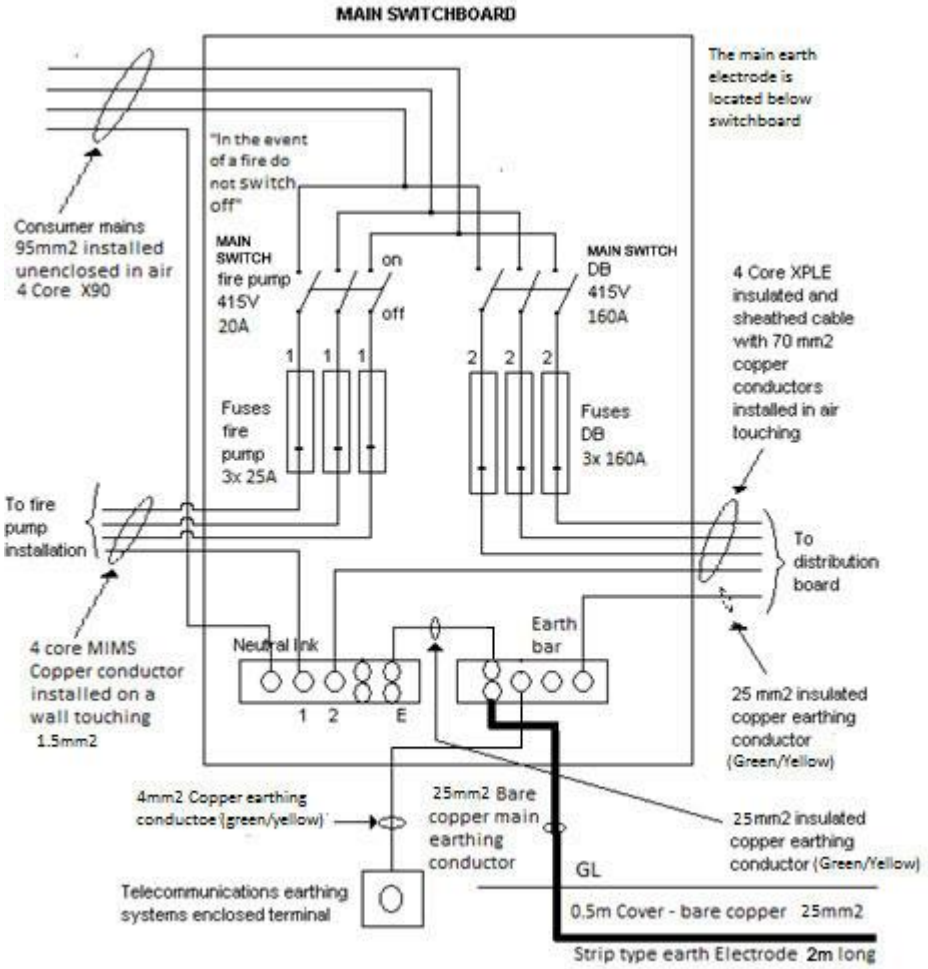
If any person is required to work within ……. of energized exposed conductors or parts, a competent person shall identify appropriate risk treatments.

.....

Standard Clause number..... [2 + 2 = 4 Marks]

INSTALLATION DEFECTS - NON DOMESTIC

Q 18.



The drawing above shows the MAIN SWITCHBOARD of an industrial installation originating at the consumers mains and contains contraventions to the Wiring Rules.

It supplies a distribution board having a connected load with a calculated maximum demand of 160 A per phase and an automatically controlled 3 phase fire pump motor having a current rating of 20 A per phase. The fire pump is not required to be RCD protected.

The multi-core MIMS cables are installed spaced from the wall and are 1/1 kV cables. The supply authority has provided short circuit protection for the consumers mains.

The safety services main switch and the main switch for the general electrical installation are separated by a metal partition.

The MEN Link has been installed at the substation.

All screws in bars or links are all 80% of the tunnel diameter

Assume the MIMS cables are earthed in accordance with the Wiring Rules and are capable of maintaining supply to the equipment even when exposed to fire and mechanical damage.

All fuses shown are HRC type.

Complete the table on the following page.

Q 18. continued.

Use the diagram on the previous page.

List **FIVE different defects** together with the contravened Wiring Rules Clause/Table number in the table provided below.

Note: Only the first five defects will be considered.

DEFECT DETAILS	WIRING RULE CLAUSE/TABLE No.

[5 x (2+1) = 15 Marks]