



**LICENSED ELECTRICIANS ASSESSMENT (LEA)**  
**Licensed Electricians Theory Examination**  
**SAMPLE EXAMINATION**

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 MUST BE SHOWN TO OBTAIN FULL MARKS

The following reference books are permitted during the assessment session:  
 AS/NZS 3000:2007 Wiring Rules (including amendments)  
 AS/NZS3012: 2010 Electrical Installations – Demolition and Construction Sites  
 AS/NZS 3008.1.1:2009 Electrical Installations – Selection of Cables  
 Electricity Safety (Installations) Regulations 2009  
 Code of Practice for Safe Electrical Work - 1997

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: \_\_\_\_\_

## WIRING RULES

In the **FIVE** following 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 must be taken into account when alternative methods of calculating the maximum demand (other than Appendix C ) are used for a particular electrical installation?

.....  
.....

Wiring Rules Clause number.....

[ 2 + 2 = 4 Marks ]

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### Q 2.

What are the requirements for earthing conductors that are jointed by soldering?

.....  
.....

Wiring Rules Clause number.....

[ 2 + 2 = 4 Marks ]

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### Q 3.

What is the difference between a PELV system and a SELV system?

.....  
.....  
.....

Wiring Rules Clause number.....

[ 2 + 2 = 4 Marks ]

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**Q 4.**

Is it permissible to connect a final sub-circuit protective earthing conductor to any point on the main earthing conductor?

.....

Wiring Rules Clause number.....

[ 2 + 2 = 4 Marks]

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**Q 5.**

Indicate the minimum side clearance for a recessed halogen lamp luminaire to a building structural member.

Answer: .....

Wiring Rules Clause number.....

[ 2 + 2 = 4 Marks]

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**CONSTRUCTION & DEMOLITION SITES**

In this question relating to AS/NZS 3012, 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 6.**

How can construction wiring be made readily distinguishable from permanent wiring other than by the use of iridescent yellow tape?

.....  
.....

Standard Clause number.....

[3 + 3 = 6 Marks]

*This question refers to PART 4 – Electrical Installation Work*

**Amendments to these regulations have been incorporated in these questions.**

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.**

Can an electricity supplier require a person to install protective equipment between the point of supply and any main switches for safety services?

.....

Regulation number.....

[2 + 2 = 4 Marks]

**ELECTRIC SHOCK SURVIVAL**

**Q 8.**

List two ways of checking for response from a casualty who has received an electric shock and been safely isolated from supply.

1. ....

2. ....

[1 + 1 = 2 Marks]

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**CABLE SELECTION**

**Q 9.**

**TWO** 50 mm<sup>2</sup> three-core X90 insulated, sheathed and armoured copper cables, including earthing conductors, are connected in parallel to supply a three-phase load.

The cables are protected by a circuit breaker and installed touching directly in the ground at a depth of 0.5m. The thermal resistivity of the soil is 1.2°C.m/W.

- (i) Neglecting voltage drop, what is the **TOTAL** maximum current carrying capacity of the cables which form the circuit?
- (ii) What would be the effect on the **TOTAL** current carrying capacity if the cables were spaced 0.3m apart?

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

(i) Answer.....

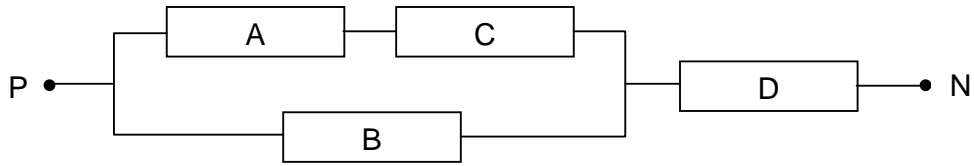
(ii) Answer.....

.....

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

## DC CIRCUITS

Q 10.



The following values apply to the diagram above -

The voltage across points P and N = 100V  
A is 25  $\Omega$ ; B is 70  $\Omega$ ; C is 45  $\Omega$  and D is 15  $\Omega$ .

Calculate:

- I. the current flowing through resistor C
- II. the voltage drop across resistor C
- III. the power dissipated in resistor A

**All calculations must be shown to obtain full marks**

**Answers:** Current..... Voltage drop ..... 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 domestic installation.

The load connected to the switchboard is:-

- 2 circuits of 12 - 10A socket outlets
- 2 circuits of 2 - 20A socket outlets
- 3 circuits of 12 - lighting points.

**All relevant Table details, 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 14A drying oven which operates continuously is supplied from a sub-circuit originating at a distribution board.

All the cables are:-

- V75 multi-core insulated and sheathed cables with circular copper conductors
- protected by circuit breakers
- not installed with other cables

The circuit details are:-

<b>Consumer Mains</b>	MD current	55A
	Length	11m
	Size	16mm <sup>2</sup>
<b>Sub-mains</b>	MD current	36A
	Length	42m
	Size	10mm <sup>2</sup>
<b>Final sub-circuit</b>	Length	25m
	Size	4mm <sup>2</sup>

The Consumers Mains and Sub-mains are operating at their maximum permissible temperatures.

The final sub-circuit cables have an operating temperature of 60°C

Calculate the total voltage drop from the 'point of supply' to the 'drying oven's terminals'.

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

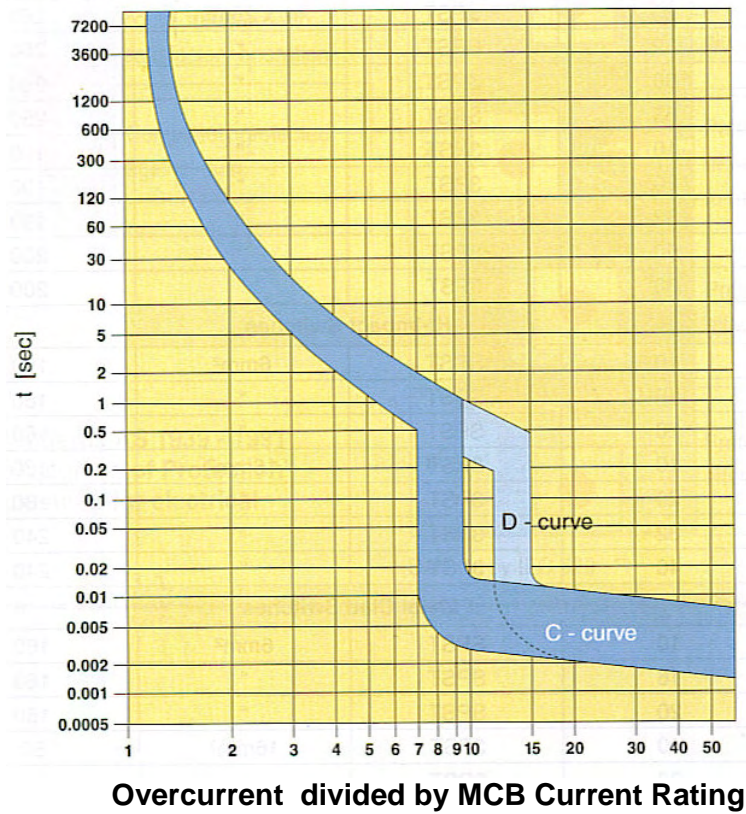
Answer: .....

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

**OVERLOAD & SHORT CIRCUIT CALCULATIONS**

**Q 13.**

What are the minimum and maximum tripping times for a 10A Type C miniature over-current circuit breaker which is subjected to an over-current of 60A?



Ratio.....

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 500KVA transformer which has a prospective fault current of 13,990A per phase.

Submains supply a distribution board from the main switchboard.

The following information is known:-

- Impedance of the Consumers Mains = 0.0040  $\Omega$
- Impedance of the Submains cables = 0.025  $\Omega$

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.**

Answers MainSw/Bd.....

Dist/Bd.....

[3+3+3 = 9 Marks]

**RESIDUAL CURRENT DEVICES**

**Q 15.**

A 30 ma RCD is to be installed in the sub-main supplying a distribution board.

- The calculated maximum demand of the sub-main is 25A.
- There are three final sub-circuits supplied from the distribution board.
- The circuits are protected by an 8A, a 16A and a 30 A circuit breakers.

What is the **MINIMUM** current rating for the RCD?.

Answer.....

[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]

**CODE OF PRACTICE**

**Q 17.**

You must supply answers to parts (i) and (ii) to obtain full marks

(i) Unless proven to be de-energised, all electrical equipment must be treated as what?

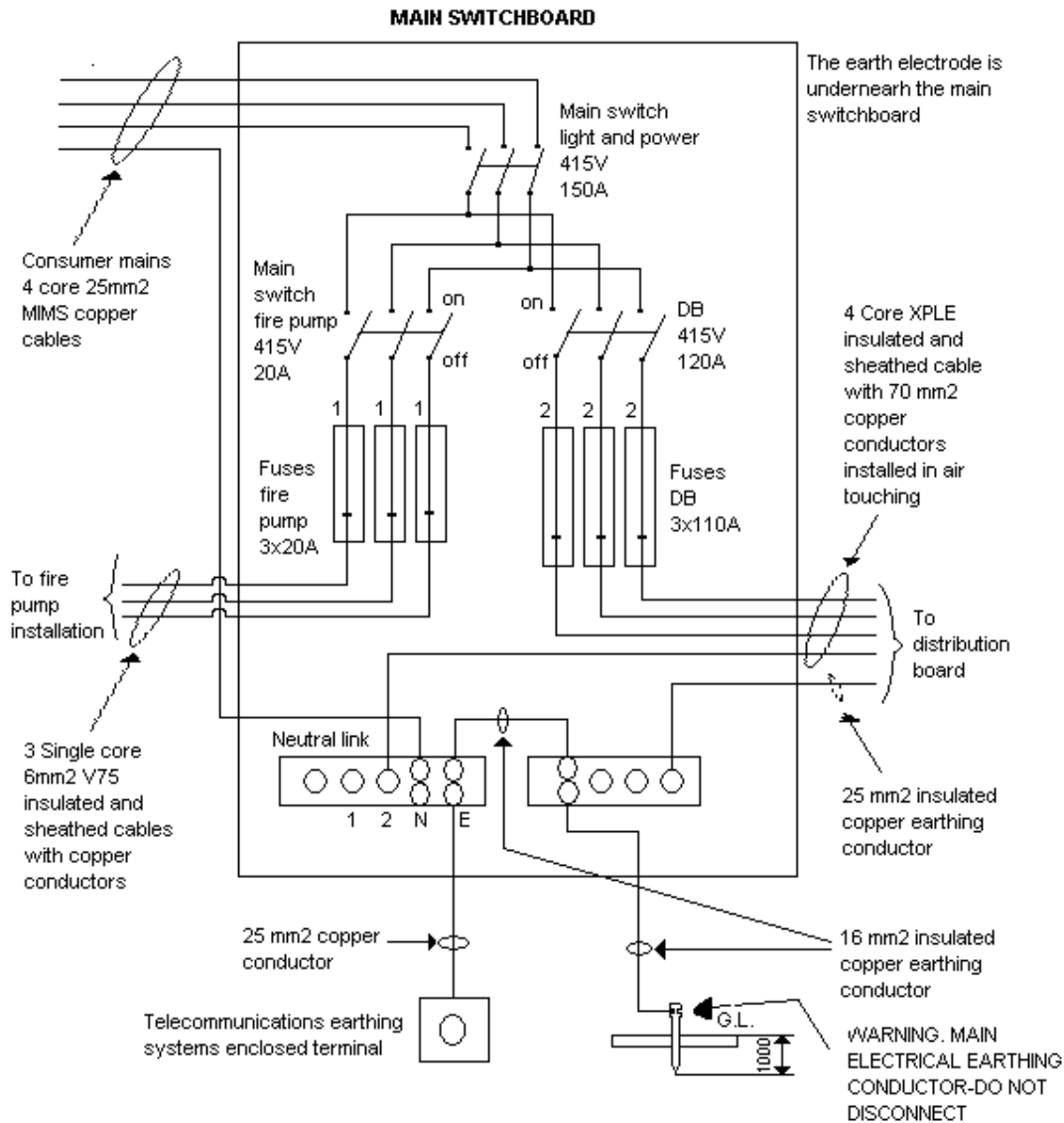
.....

(ii) Code 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 100 A per phase and an automatically controlled 3 phase fire pump motor having a current rating of 20 A per phase.

The multi-core MIMS cables are installed spaced from the wall.

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 ]