



## EXAMINATION: AUTHORISATION B

September 2020

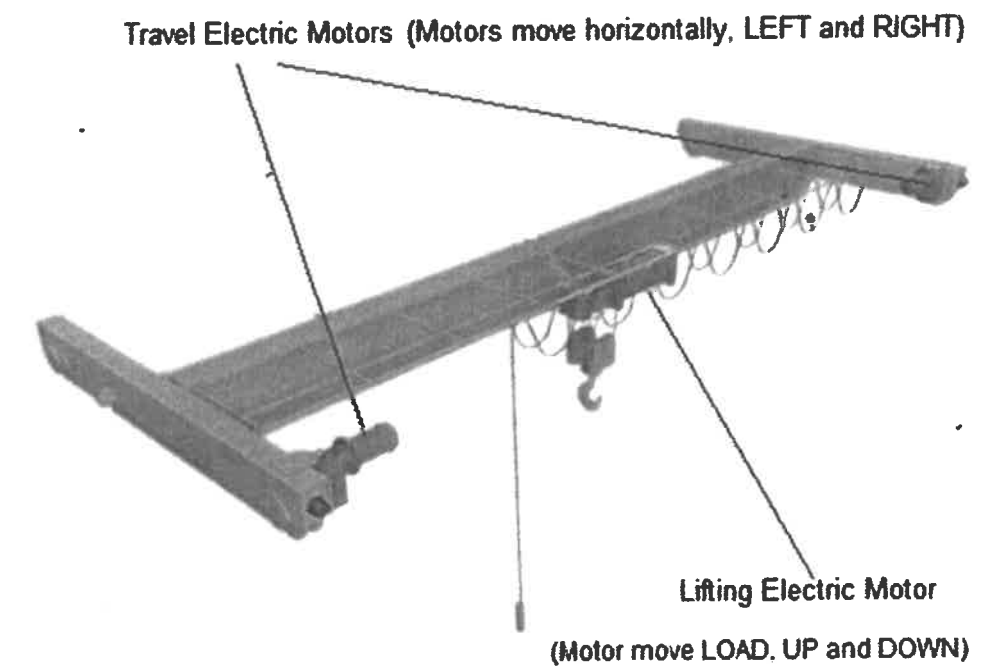
Practical Test

Time Allowed – 1 Hour

Name & Surname \_\_\_\_\_  
(In Block letters)

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Refer to Figure 1



**Figure 1**

**Note:**

- The Travel for the **INDUCTION MOTORS**, maximum horizontal movement on both sides are controlled by two sensors namely S1 and S2.
- The **LIFTING INDUCTION MOTOR** is only limited for the upward movement and controlled by a limit switch – S3.

Read the question below carefully:

An overhead traveller crane is required to travel along the workshop overhead rail using two identical 3 kW 'Travel Induction Motors' (installed one on each side) as shown in **Figure 1** above. Both motors are coupled to a very low speed reduction gearbox. It is important to note that the horizontal movement is limited by two sensors.

Attached to the overhead traveller is a 'Lifting Induction Motor' which moves load Up and Down and across. The motor is coupled also to a very low speed reduction gearbox and equipped with a clutch.

- (a) Draw a circuit diagram showing the control of the **two Travel Induction Motors ONLY**. All the motors are operated from a 10 m suspended cable connected to a pendant box.

The general requirements for the overhead traveller shown in **Figure 1** are:

- i. **Travel Induction Motors** – forward and reverse motion (both motors are coupled together)
- ii. stop button
- iii. sensors S1 and S2 to limit maximum movement
- iv. overload current device for EACH Motor
- v. contactors and auxiliary contacts
- vi. control transformer 400 V/24 V. **(36 marks)**

- (b) State the precaution to be taken to eliminate short-circuit during the forward or reverse motion selection. **(4 marks)**

Your drawing must show:

- one common 4-pole Contactor for the two **Travel Induction Motors** used for the Forward motion
- one common 4-pole Contactor for the two **Travel Induction Motors** used for the Reverse motion
- two Auxiliary contacts (normally closed)
- one stop button
- one forward button
- one reverse button
- overload protection for each motor (complete with normally closed contacts)
- two three-phase Induction motors 400 Volts, 50 Hz, 3 kW (each) assume 0.8 lag power factor
- one step-down transformer 400 V/ 24 V
- pendant box.