higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTROTECHNOLOGY
NQF LEVEL 3

XX February 2020

This marking guideline consists of 5 pages.

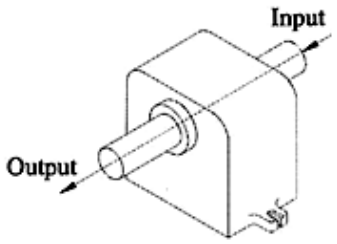
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QUESTION 1

1.1 1.1.1 Bibby coupling (1)

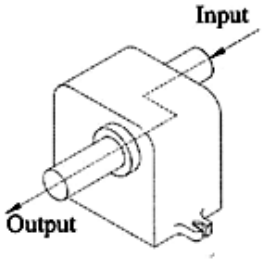
1.1.2 It is better to join short shafts with couplings because:
- Manufacturing of long shafts is expensive and difficult.
- Transportation of long shafts is difficult.
- Handling and installation of long shafts are time consuming and difficult. (3)

1.2 1.2.1



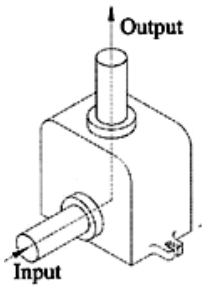
Concentric shaft reducer

1.2.2



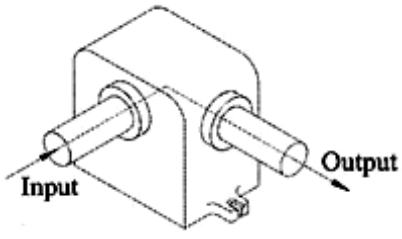
Parallel shaft reducer

1.2.3



Vertical shaft reducer

1.2.4



Right-angled shaft reducer

(4 × 2) (8)

1.3 Gear drives and chain drives (2)

1.4 1.4.1 Chain drives are positive drives that do not rely on friction to transmit power. It has no slip. Power can be transmitted over long or short distances depending on the type of chain.

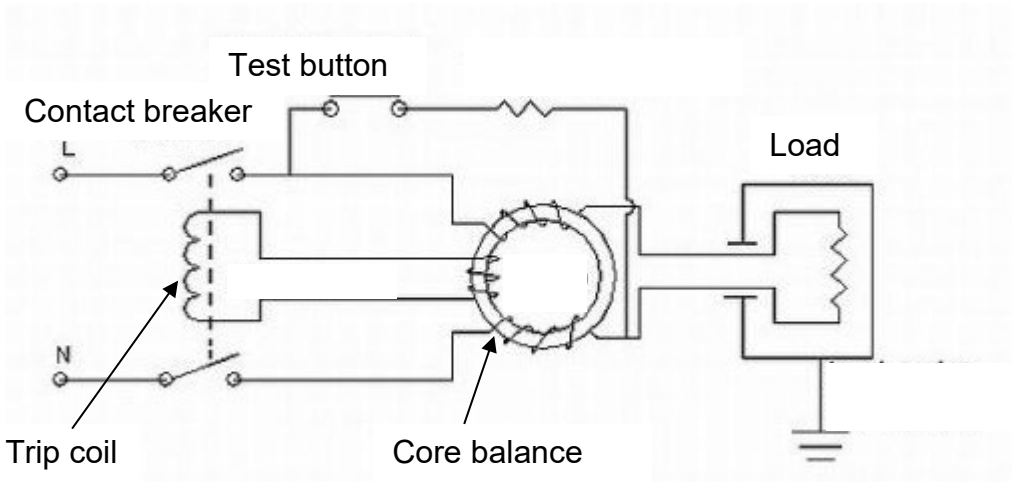
1.4.2 V-belt drives consist of a flexible member that runs on a set of pulleys mounted on shafts. V-belts are friction drives that are quiet, smooth and economical. It requires a lot of tension because of the V cross section or wedge. Less tension means longer belt and bearing life.

1.4.3 Gear drives are positive drives between the input and output. It can only be used in short distances. Gear drives are the most effective with no slip. Gear drives can also be used in angle transmitting of power.

(3 × 2) (6)
[20]

QUESTION 2

2.1



(5 for labels + 4 for drawing) (9)

2.2
- Compliance
- Fundamental requirements
- Installation requirements
- Special installations or locations
- Verification and certification (Any 4 × 1) (4)

2.3
- Ensure that electrical test equipment is correctly insulated.
- Wear insulated gloves where possible.
- Ensure you are well insulated from ground when testing for input voltage at various points.
- When removing covers and enclosures, replace it after testing.

(Any 3 × 1) (3)

2.4 2.4.1 Exposed
2.4.2 Extraneous
2.4.3 Extraneous
2.4.4 Exposed

(4 × 1) (4)
[20]

QUESTION 3

3.1 3.1.1
- ON/OFF switch: Switching the circuit on or off
- E-stop: Operated when there is a problem or when the power must be cut off
- Overload protection: Overcurrent and short-circuit
- Two stop push buttons: Switching off the motors individually
- Start push button: Starting the circuit manually
- Motor A contactor coil: Energising the auxiliary contacts and main contacts
- Delay on timer contactor coil: Automatically switching on motor B

(7 × 2) (14)

3.1.2 The circuit is connected to an external supply voltage. The ON/ OFF switch is used to switch power to the circuit ON or OFF. The emergency stop is used to disconnect the circuit from the supply in case of an emergency. When the power is on, the start push button is pressed to activate the relay coil MA which will then start motor A. At the same time the timer T1 is activated and starts to count to 15 seconds. When 15 seconds is reached, the contacts of the timer will close activating the motor relay MB. This will start motor B. There are two stop push buttons which can be used to stop either motor A or motor B individually. The two overload (O/L) protection devices will be activate as soon as there is an overload current drawn by either one of the motors and will stop the specific motor. (10)

3.1.3 Overload devices do not trip under normal conditions, unless the settings are not correct. Care must be taken when setting the overload-protection device. The value set must not be less than the operating current in the circuit. (3)

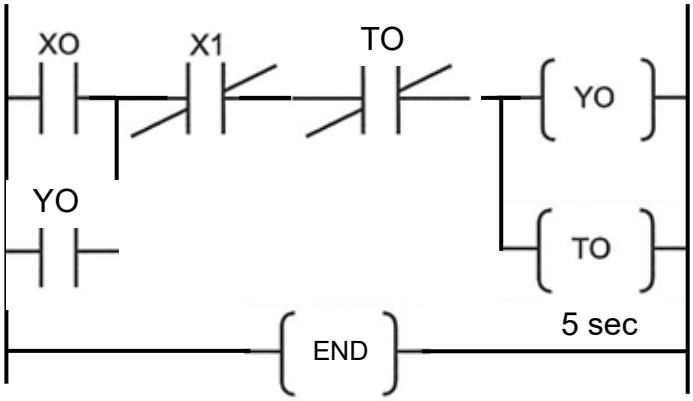
3.2
- Digital or analogue multimeter
- Insulation-resistance tester (Megger)
- Voltage or current tester

(3)
[30]

QUESTION 4

4.1
- Stop: Stops the operation
- Forward: Begins the operation in a forward/one direction
- M2: Relay logic normally closes to prevent the motor to run forward if reverse is pressed
- M1 and M2: Relay logic output coils for forward and reverse actions
- O/L: Overload protection normally closes contact
- M1 and M2: Relay logic normally opens to be used as a latch for forward and reverse
- Reverse: Begins the operation in the reverse/opposite direction
- M1: Relay logic normally closes to prevent motor to run reverse/opposite direction if forward is pressed (8)

4.2



(8)

4.3
4.3.1 Timer
4.3.2 Output coil
4.3.3 Normal open (NO)
4.3.4 NC (close) contact

(4 × 1) (4)
[20]

QUESTION 5

5.1
- Voltage
- Speed
- Full-load current
- Number of phases and frequency
- Full-load power
- Service application (Any 4 × 1) (4)

5.2
5.2.1 Install a larger device rated for jogging service.
5.2.2 Remove fault and check to be sure breaker size is correct.
5.2.3 Replace contact spring and check carrier for damage.
5.2.4 Check system voltage and voltage drops during starting.
5.2.5 Replace.
5.2.6 Check coil number.

(6 × 1) (6)
[10]

TOTAL: 100

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