Province of the
EASTERN CAPE
EDUCATION

DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)

HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET

SUBJECT	WELDING & METALWORK	**GRADE**	12	**DATE**	JULY 2020
TOPIC	MAINTENANCE AND TERMINOLOGY	**TERM 1 REVISION**	(Please tick)	**TERM 3 CONTENT**	(√)

QUESTION 1 MAINTENANCE (SPECIFIC)

1.1 Locking out of large machines before maintenance:
- Due to the danger associated with large machines
- To ensure that isolation switches are switched off
- To ensure that switches are locked out and tagged to inform others that maintenance work is being done
- To ensure that nobody can turn on the machine while maintenance is being done.   (Any 2 x 1)

1.2 **Tagging plates**:

It has multiple holes so that more than one technician can lock out the machine simultaneously.

1.3 Major and minor services for power-driven guillotine:

Major service allows for on-going service procedures that are designed to maintain the guillotines in premium working conditions.

Minor service is designed to minimise major mechanical and electrical failures, by employing the principle of preventative maintenance.

1.4 Maintenance guidelines for a pedestal drilling machine:
- Visual checks of electrical wiring, switches, etc.
- Verify that all guards are secure and function correctly.
- Ensure workspace is clear.
- Confirm availability and conditions of PPE.
- Lubricate moving parts.
- Use moisture-penetrating oil spray to prevent rust.
- Check for availability of specific tools.
- Check the run-out of the spindle.
- Inspect belts for wear.
- Ensure the drive belt is correctly tensioned.
- Check the condition of the rack and pinion mechanisms and lubricate.
- Ensure cuttings are removed.
- Inspect the Morse taper sleeves for burrs/scratches.
- Check the security of machine mountings. (ANY 2)

1.5 **Overloading a punch and shearing machine:**

- Dulling or breaking blades/punches.
- Putting strain on the motor and drive mechanism.

QUESTION 2 MAINTENANCE

2.1 Effect of overloading:

2.1.1 Power saw:

- Driving motor will be damaged.
- Excessive strain on the driving system.
- The cutting blade will be damaged.
- The blade may deflect and result in a skew cut.   (ANY 1)

2.1.2 Bench grinder:

- Result in malfunction due to excessive loads on the spindle bearings, grinding wheel and machine motor.
- Overloading will wear the grinding wheel excessively and unevenly.
- It shortens the life span of the spindle bearings and motor.   (ANY 1)

QUESTION 3 MAINTENANCE Effect of friction:

3.1 **Drill bit of a pedestal drill:**

- Due to the heat caused by friction the cutting edge of the drill bit softens / blunt.
- Lifespan of the drill bit will be reduced.   (ANY 1)

3.2 **Rolling machine's bearings:**

- Journals and bearings will prematurely wear out.

QUESTION 4 MAINTENANCE A punch and a shearing machine:

- Check the condition of the switch gear, wiring and isolation.

2

- Ensure that the isolator is lockable.
- Check the condition of the stop / start equipment.
- Check the operation of emergency stop where fitted.
- Check connections of electrical wiring.   (ANY 2)

QUESTION 5 MAINTENANCE - Record keeping:

- Monitoring of the machine's condition.
- Monitoring of the maintenance costs on the machines.
- Upholding the warranties and guarantees.   (ANY 2)

QUESTION 6 TERMINOLOGY (DEVELOPMENT) (SPECIFIC)

6.1 Conical hopper:

6.1.1 **Vertical height (DE):**

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} \checkmark$$
$$DE = \tan70° \times E \checkmark$$
$$= 2{,}75 \times 1$$
$$= 2{,}75 \text{ m}$$

6.1.2 Main radius (AC):

$$\cos\theta = \frac{adjacent}{hypotan\iota}$$

$$AC = \frac{BC}{\cos 70°}$$

$$= \frac{2}{0,34}$$

$$= 5,88 \text{ m}$$

6.1.3 Small radius (AD):

$$\cos\theta = \frac{adjacent}{hypotanuse}$$

$$DC = \frac{EC}{\cos 70°}$$

$$= \frac{1}{0,34}$$

$$= 2,94 \text{ m}$$

Now AD can be calculated

$$AD = AC - DC$$

$$= 5,88 - 2,94$$

$$= 2,94 \text{ m}$$

4

6.1.4 **Circumference:**   Circumference = π x MD

$$= π \times 4$$

$$= 12.57 \text{ m}$$

QUESTION 7 TERMINOLOGY (DEVELOPMENT) - Square-to-round transition piece:

7.1 The true length FG is firstly needed to draw the pattern:

$IK = 300 \, (2 \, \text{units})$

$IH = 150 \, (1 \text{unit})$

$HK = 1\sqrt{3} \, (1 \text{unit} \times \sqrt{3})$

The true length FG:

   Plan length FG = FG − GK   ✓

$$= 400 - 300$$

$$= 100 \text{ mm} \quad ✓$$

The true FG is equal to H'F

$$H'F^2 = H'G^2 + GF^2 \quad ✓$$

$$= 800^2 + 100^2 \quad ✓$$

$$H'F = \sqrt{650000}$$

True length FG = 806 mm   ✓

5

7.2 To determine the plan length CI, the sides CE and EI of triangle CEI must be calculated.

$$CE = CF - EF$$
$$= 400 - 150$$
$$= 250 \text{ mm} \qquad \checkmark$$

$$But \, EI = FH$$
$$FH = FK - HK$$
$$= 400 - 259,8$$
$$= 140,2 \text{mm} \qquad \checkmark$$

$$\text{True length}(CI) = FH^2 + EI^2 \qquad \checkmark$$
$$= 250^2 + 140,2^2$$
$$= \sqrt{82156,04}$$
$$= 286,63 \text{ mm} \qquad \checkmark$$

7.3 JI is one-twelfth of the circumference

$$\text{Circumference} = \pi \times MD$$
$$= \pi \times 600$$
$$= 1884,9 \text{ mm}$$

$$\frac{1}{12} \text{Circumference} = \frac{1884,9}{12}$$
$$= 157,1 \text{mm}$$

QUESTION 8 TERMINOLOGY (DEVELOPMENT) An off – centre rectangular to rectangular hopper.
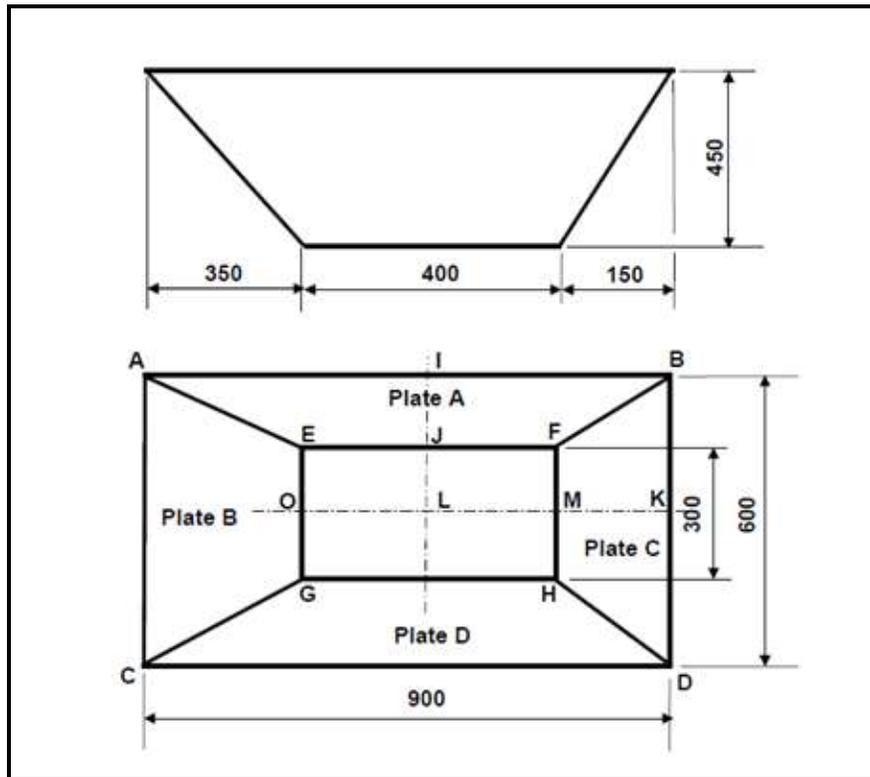
8.1 Length of IJ:

Plates A and D.

$$IJ = IL - JL \quad \checkmark$$
$$IJ = 300 - 150 \quad \checkmark$$
$$IJ = 150\,mm \quad \checkmark$$

8.2 True length of AE:

$$\text{True Length } AE = \sqrt{IE^2 + AI^2 + VH^2} \quad \checkmark\checkmark$$
$$AE = \sqrt{150^2 + 350^2 + 450^2} \quad \checkmark\checkmark$$
$$AE = 589.49\ mm \quad \checkmark$$
$$= 590\ mm \quad \checkmark$$

8.3 Length of MK:

$$MK = LK - LM$$
$$MK = 350 - 200 \quad \checkmark$$
$$MK = 150\ mm \quad \checkmark$$

8

8.4 The True length of DH:

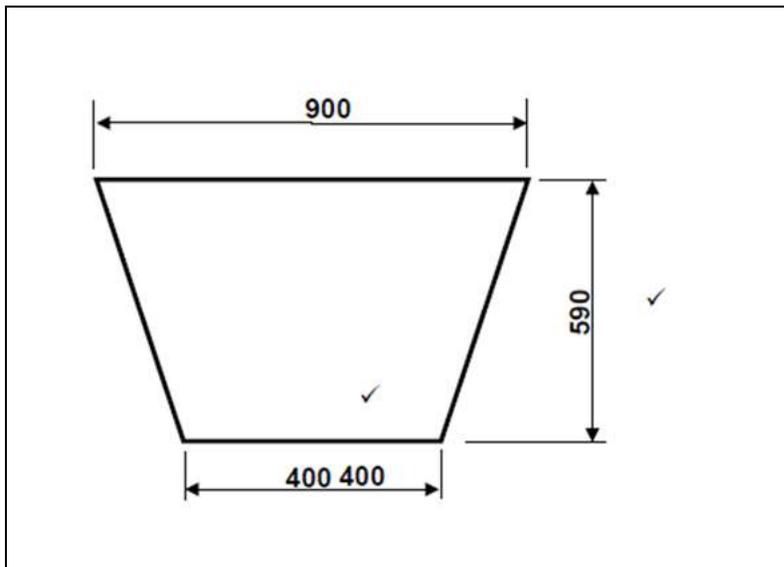$$\text{True length } DH = \sqrt{HK^2 + KD^2 + VH^2} \quad \checkmark\checkmark$$
$$DH = \sqrt{150^2 + 150^2 + 450^2} \quad \checkmark\checkmark$$
$$DH = 497.49 \text{ mm} \quad \checkmark$$
$$\text{SAY } 498 \text{ mm} \quad \checkmark$$

8.5 Pattern for plates A:

9

8.6 Pattern for Plate C: