30.16 METAL WORK (445)

30.16.1 Metal Work Paper 1 (445/1)

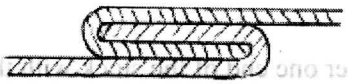
1. (a) EXTINGUISHING AGENTS
   (i) foam
   (ii) carbon dioxide
   (iii) powder
   (iv) dry powder — 2 x ½

   (b) REASONS FOR INVENTORY
   (i) provides a record of what is available
   (ii) monitors any movement to avoid losses
   (iii) guides in determining additional equipment — any 1 x 1

2. (a) REASONS FOR MARKING OUT
   (i) defines the shape of an article
   (ii) locates position of features like holes
   (iii) minimises wastage
   (iv) provides cutting guide
   (v) aids in clamping — any 3 x 1

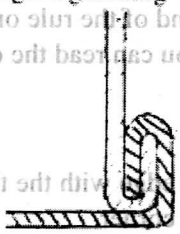
   (b) SHEETMETAL JOINTS

   (i)



   for widening/lengthening — 1 ½ x 2

   (ii)



   for closing up a box or cylinder — 2 x ½

3. (a) (i) DIES - circular
   - split/adjustable — 2 x ½

   (ii) CUTTING OIL - cools the tap or die
   - lubricates the thread — 2 x 1

   (b) T = D - P where T = tapping Ø
   D = root Ø
   P = pitch
   T = 10 - 1.5 = 8.5m — 2 marks

4. (a) Ruler has clearance between its end and zero mark while calibration in a rule starts right at the end..

(b) In unilateral tolerance only one limit is given from nominal size while in bilateral tolerance both limits are given.

(c) Trysquare marks and tests only right angles while sliding level can mark and test any angle.

3 x 1

5. (a) HEAT TREATMENT is a process of heating steel to a certain temperature and cooling it at a controlled rate in order to give it a desired property.

(b) HEAT TREATMENT OF FILE
Heat file to hardening temperature.
Quench in water or brine.
Heat again to tempering temperature
Cool in atmosphere

4 x 1

6. RIVETS

(a)	Pan head	- where maximum strength is required.
(b)	Flat head	-general rivet work for normal strength.
(c)	Bifurcated	-joins leather or plastic to metal.

name = 3 x ½
application = 3 x ½

7. METHODS
Appearance
Cold hammering
Chips from drilling
Spark test by grinding

any 4 x 1

8. DIFFERENCES
Oxygen and acetylene cylinders — colour, size, thread, safety plugs

any 3 x 1

BRAZING
-Parent metal not melted
-Uses flux
-Uses spelter as filler metal
-Uses oxidizing flame (lower temperature)

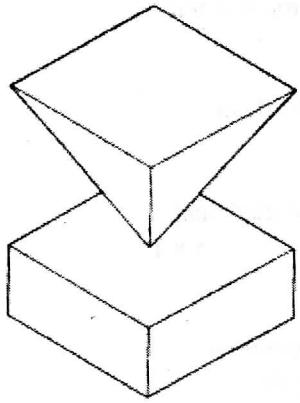
GAS WELDING
-Parent metal melted to fuse
-No flux used
-Uses same metal as parent metal
-Uses neutral flame (higher temperature)

any 3 x 1

9. REASONS FOR APPLYING PRIMER
- Prevents corrosion on the surface
- Enables paint to adhere to the surface
- acts as filler for uneven surface

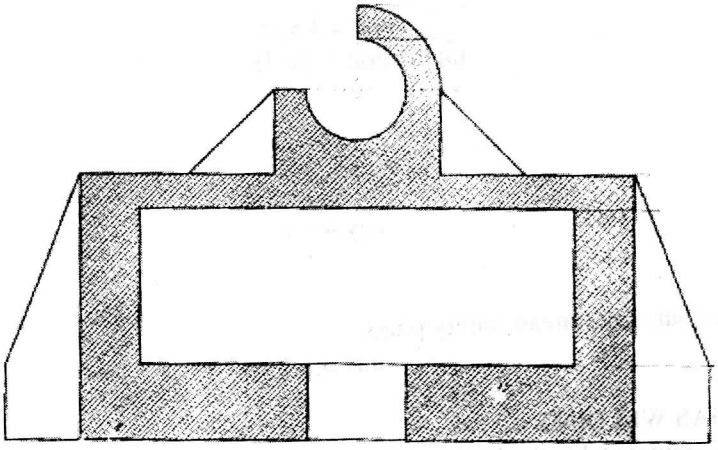
any 2 x 1

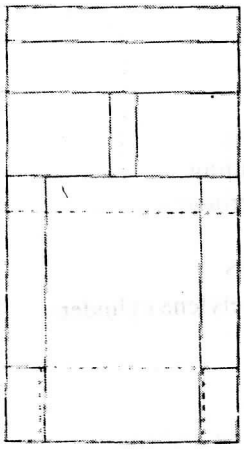
10.



6 faces x ½ = 3
Isometric = 1
Total 4

11.





SECTION:
6 faces x 1 = 6
Hatching 1
Centre lines (3 x ½) = 1½

END ELEVATION:
10 faces x ½ = 5
Hidden details = 1
Neatness = ½

Total 15

12. (a) TESTING METHODS
Inspection
Fluid or die penetration
X - ray
Magnetic
Subjecting to stress

any 3 x ½

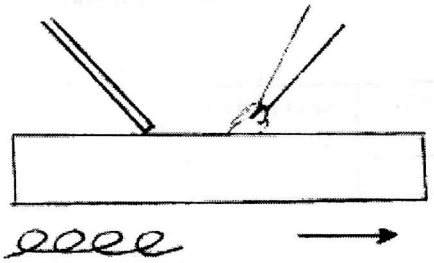
(b) (i)

Oxidizing flame

2 marks

(ii) Open the acetylene cylinder half turn.
Open the oxygen cylinder full turn
Open acetylene needle valve and set to required pressure.
Open oxygen needle valve and set to required pressure.
Open acetylene valve slightly and light the torch.
Increase gas till flame is clear of soot.
Open oxygen valve and set flame to oxidizing. 7 x ½=3 ½

(c)



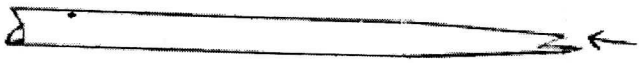
sketch = 2
labelling = 3

REASONS FOR TECHNIQUE
Less gas used
cooling rate is lower
Faster than leftward
Better view of motten pool
No bevel required.

any 3 x 1

13. (a) PIPING

(i) Hollow point developed at the tip of a bar when drawing down



(1 mark)

(ii)

½ mark

(iii) When drawing down:
- forgé the cross section to square
-forge the cross section to octagon
-forge the cross section to round

1 ½ marks

(b) FULLERING

Marking the portion to be forged.
Heat the portion to be forged to be right temperature.
Position the end between the fullers.
Hammer the top fuller to reduce the thickness.
Repeat steps 2, 3 and 4 until the required size is approached.
Use flatter to smoothen the surface and finish to size.

CORRECT PROCEDURE — 5 x 1 =5 marks
ANY CORRECT TOOLS NAMED — 10 x ½ = 5 marks
ANY APPROPRIATE SKETCHES — 4 x ½ =2 marks

14. (a) (i) CUTTING LIST

PART NO.	NO. OF PARTS	DESCRIPTION	CUTTING SIZE	MATERIALS

Used when preparing work pieces

6 x ½

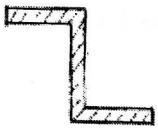
(ii) BILL OF MATERIALS

PART NO.	NO. OF PARTS	DESCRIPTION	CUTTING SIZE	MATERIAL	UNIT COST	TOTAL COST

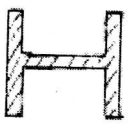
Used when ordering material

8 x ½

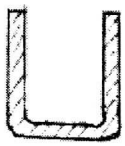
(b) FORMS OF METAL

(i)  Z - bar for window frames and casing

(ii)  Angle iron for door frames.



(iii) H - bar for roofing trasses

(iv)  U bar for channels 4 x 2 = 8 marks

15 (a) LOCATING CENTRE OF ROUND BAR
Place bar on a vee-block
Set the scriber to a point below/above centre
Scribe a line.
Rotate the bar about ⅛ turn and scribe a line.
Rotate the bar again ¼ turn and scribe a third line.
Rotate the bar again ¼ turn and scribe a fourth line.
Joint the diagonals of the quadrilateral to intersect at the centre.
6 x ½ =3 marks

(b)
A Anvil - supports one end of the work being measured.
B Spindle - moves in and out to determine actual reading.
C Locking nut to lock spindle in position.
D Sleeve or Barrel gives the main scale.
E Thimble moves spindle to give micrometer scale.
F Ratchet provides correct feel/even pressure. 6 x 1 = 6 marks

(c) (i) - Sleeve/barrel reading 09.00mm
-Thimble reading 00.44mm
9.44mm

(ii) - Sleeve/barrel reading 16.50mm
-Thimble reading 00.27mm
16.77mm

(iii) - Main scale reading 13.00mm
-Various scale reading (8 x 0.05) 0.40mm
13.40mm

(iv) - Main scale reading 28.00mm
-Various scale reading (8 x 0.05) 0.48mm
28.48mm

4 x 1½ =6 marks