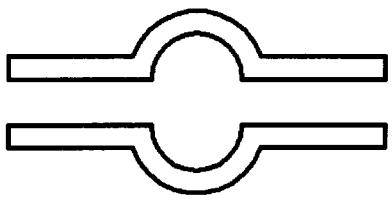
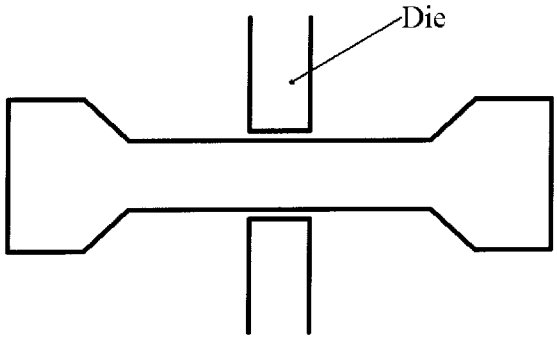
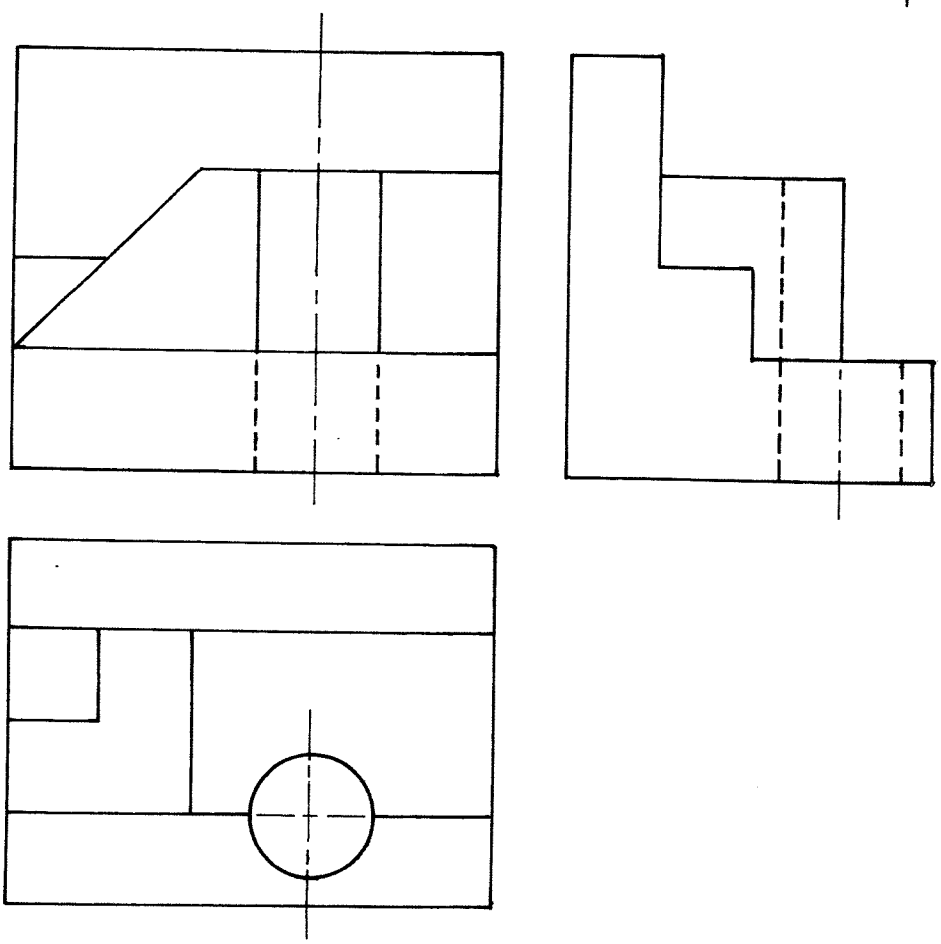
4.17 METALWORK (445)

4.17.1 Metalwork Paper 1 (445/1)

1. (a)	- Enable learners draw - Enable learners interpret drawings - A way of communication **Any 1 x 1 =(1 mark)**	**(2 marks)**
(b)	Semi-skilled workers are those who perform operations that do not require high degree of expertise. 1 x 1 = (1 mark)	**(1 mark)**
2. (a)	- Purpose of market survey is to find out the general demand position of the items that the enterprise wishes to engage in. 1 x 1 = (1 mark)	**(1 mark)**
(b)	To make profits 1 x 1 = (1 mark)	**(1 mark)**
3. (a)	(i) They leave very little residue to clean up. (ii) They do not contaminate anything with which they came into contact. 2 x ½ = (1 mark)	**(1 mark)**
(b)	(i) Magnetism - ability for metals to attract or repel other metals. (ii) Fusibility - property of a metal to become liquid when heated. (iii) Ductility - ability for metals to be drawn into fine wire without breaking. 3 x 1 = (3 marks)	**(3 marks)**
4. (a)	(i) Allowance is the difference in size between the lower limit of the hole and the upper limit of the shaft. (ii) Tolerance is the difference between the upper limit and lower limit of a hole or shaft. 2 x1=(2 marks)	**(2 marks)**
(b)	Procedure of finding the depth of a blind hole. (i) Press the square head firmly against the top of the blind hole. (ii) Slide the steel rule along the square head until end touches the bottom of the blind hole. (iii) Clamp the steel rule and take the reading. 3x1=(3 marks)	**(3marks)**
5. (a)	(i) To remove the material clogging the grains. (ii) To remove worn out grains and expose sharper ones. (iii) Make the wheel even and balanced. 3 x 1 = (3 marks)	**(3 marks)**
(b)	- To give additional rigidity/strength - For decoration/aesthetics purposes - For safety 2 x 1 = (2 marks)	**(2 marks)**
(c)	Folding bar is used for bending wide sheet metals at right angles. 1 x 1 = (1 mark)	**(1 mark)**

6. (a)	- Holes will not line up/align. - Rivet end distorts and does not go through the hole. - Plates will not close properly. 3 x 1 = (3 marks)	**(3 marks)**
(b)	(i) A gap, groove, fillet or slot is created at the joint and filled with the molten filler to form the bond as in welding. (ii) The joint is closely fitted and the molten filler metal is drawn into it by attraction/adhesion 2 x 1 =(2 marks)	**(2 marks)**
7. (a)	- Electrode selection - Current setting - Arc length - Electrode angle - Material preparation Any 4 x 1 = (4 marks)	**(4 marks)**
(b)	Cross slide – for feeding and facing Compound slide – allows for shorter taper tuning Headstock – contains all gears and mechanisms suitable for range of spindle speeds. 3 x 1 = (3 marks)	**(3 marks)**
8.	- When steel is heated temperature rises uniformly till it reaches 725° (dull red heat) and remains stationary for a moment. - When the piece of steel is cooled from 800°c temperature drops uniformly till it reaches 725°c and it remains stationary for a moment. 2 x 1 = (2 marks)	**(2 marks)**
9.	a) Upsetting is the process of reducing the length of material while increasing the size of diameter between the dies.  b) Drawing down in shaping the material by forcing it while hot between dies to the required shape mostly cylindrical. 	**(3 marks)**

10. (a)	(i) Process of clipping the brush into a paint or any other coating material. (ii) When too much paint is applied on a surface it tends to move towards the lower parts, forming thick wavy layers called runs. (iii) Immersing the object to be painted in the paint after thinning the paint. 3 x 1=(3 marks)	**(3 marks)**



Correct angle of projection- 1 mark

<u>Front Elevation</u>

6 faces @ 1 (6x1) = 6 marks

Hidden details (2X1/2) = 1 mark

<u>End Elevation</u>

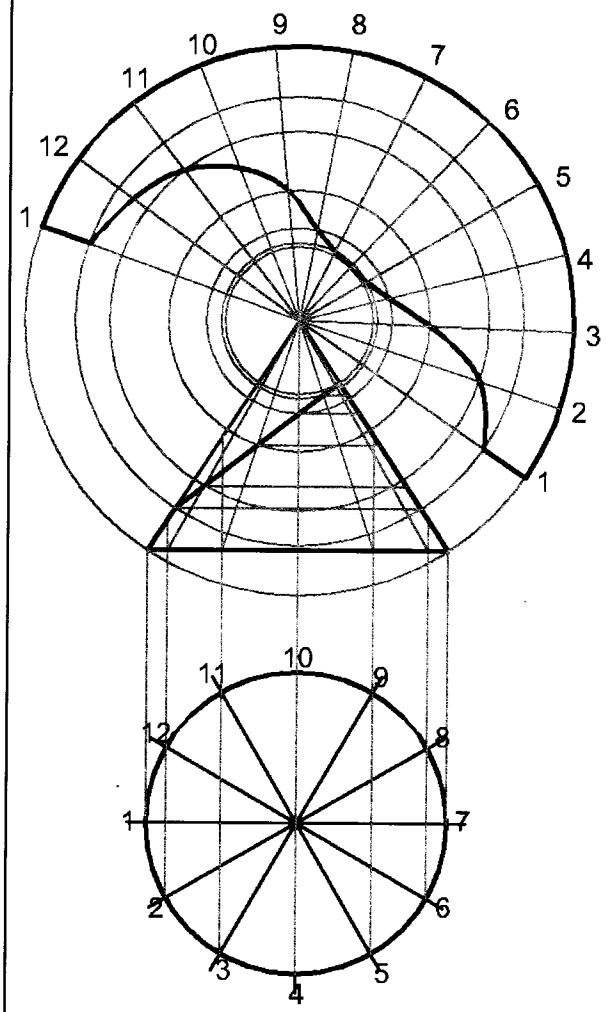
2 faces @ 1 (2x1) = 2 marks

<u>Plan</u>

5 faces @ 1 (5x1) = 5 marks

Total = 15 marks

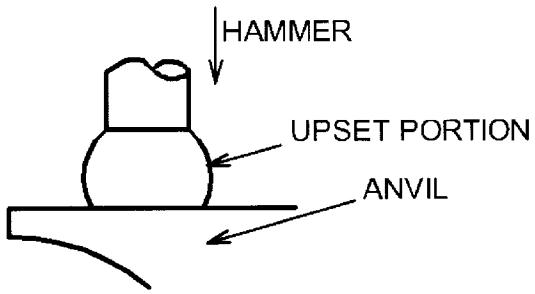
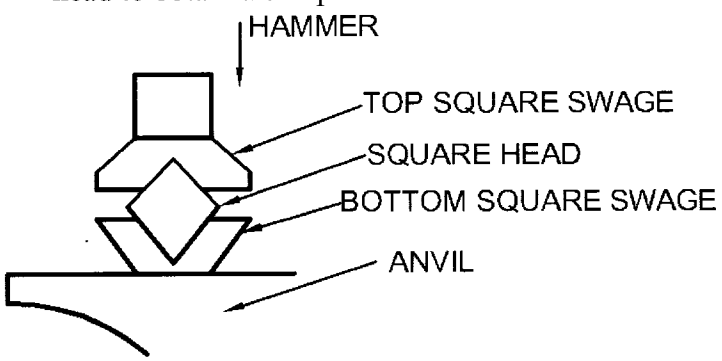
SOLUTIONS



Base circle - 1 mark
Division of circle – 2 marks
Projection to front elevation -2 marks
Projection to the apex – 2 marks
Projection to the outer arc – 2 marks
Development – 2 marks
Quality of curve -2 marks
Correct lowest point – 2 marks
Total = 15 marks

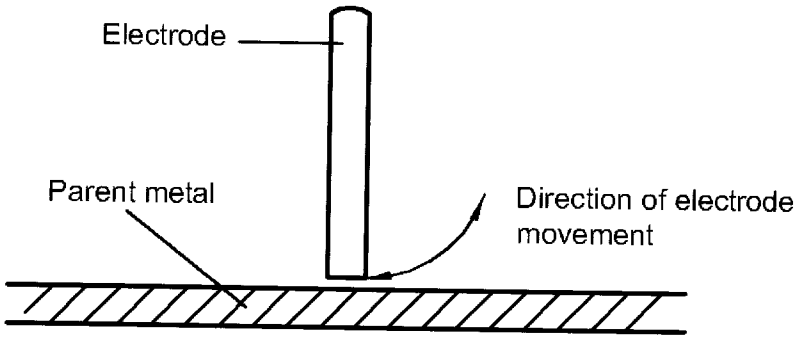
13. (a)	a) SOLUTION (1 mark) b) Procedure (i) Parallel turn the whole length to diam. 24. (ii) Face side A and chamfer the corner. (iii) Hold side A and face side B slightly in readiness for centre drilling. (iv) Centre drill side B to accommodate dead centre. (v) Apply cutting oil in the hole and support the side with a dead centre. (vi) Parallel turn side B to diameter 16. (vii) Set the knurling tool squarely to the workpiece and to the centre height. (viii) Engage the lathe to a slow speed. (ix) Feed the knurling tool gently on to the surface of a rotating workpiece until the knurls are formed in the region. (x) Form the parting off tool to R3. (xi) Set the formed tool squarely to the workpiece and to the centre height. (xii) Feed the formed tool gently on to the shoulder until the corner is formed. (xiii) Remove the centre and face off the end to the given dimension. (xiv) Chamfer the end A. (xv) Chamfer the end B. 15 points @ 1= 15 marks Total =15 marks	**(1 mark)** **(15 marks)**

14. (a)	(i) Shovel – for collecting the fuel for the forge. (ii) Poker – for loosening the clinker formed. (iii) Rake – for removing the clinker or any other material from the forge fire. 3 x 1 = (3 marks)	**(3 marks)**

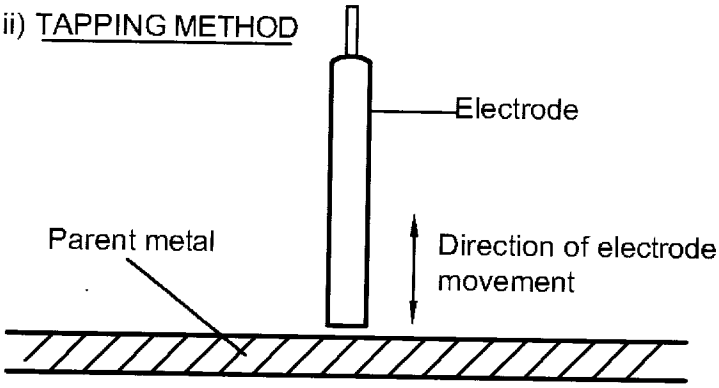
(b)	(i) Mark and heat the portion to be forged. (ii) Upset the portion by hammering it on the anvil.  (iii) Select a hole on a swage block that can accommodate the shank of the bolt. (iv) Reheat the head, slide the shark through the hole and hammer the head to obtain a sharp shoulder.  (v) Reheat the head and hammer it gently on the anvil to form a square shape. (vi) Reheat the head, position it between square swages. Hammer the top swage to obtain a perfect square head. 6 steps @ 1 = 6 marks 3 sketches @ 2 = 6 marks Any three correct sketches.	

15. (a) **SOLUTION**

(i) Scratching method



(b) (ii) TAPPING METHOD



Naming - ½
Labelling - 2x½
Direction - ½
Sketch - 1

3x2 sketches = 6 marks

Solution

- Slide the steel rule through the slot in the centre head and lock it with the clamping nut of the centre head such that the steel rule protrudes longer than the diameter of the round bar on the inner side of the centre head.

(2 marks)

- Hold the centre head against the edge of the surface whose centre has to be found. The two arms should touch the sides and the steel rule should be flat on the end of the round bar.

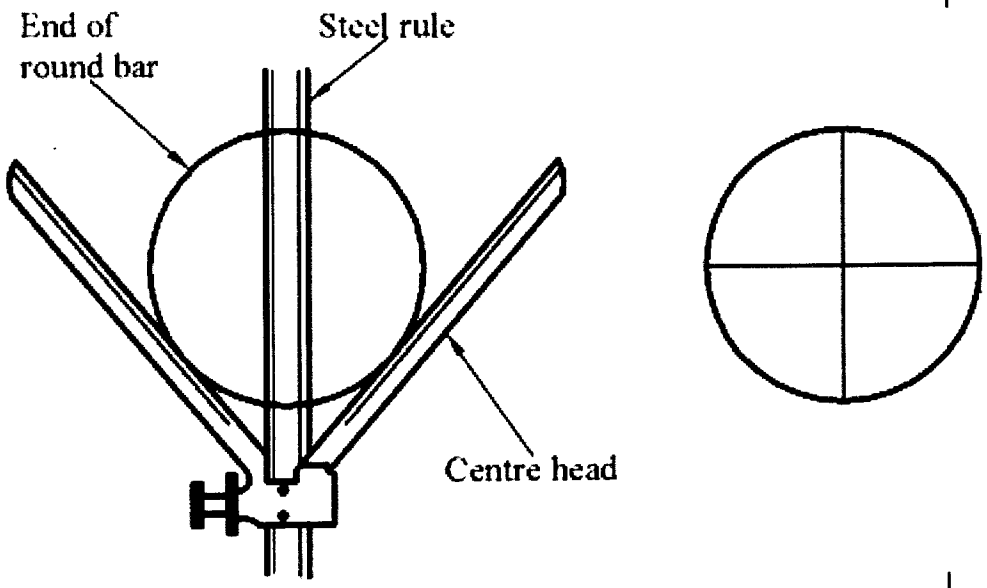
(2 marks)

- Scribe a line across the end of the round bar.

(1 mark)

- Rotate the bar and scribe another line the same way.

(1 mark)

- The point of intersection is the centre of the end of the bar.

(3 marks) **(8 marks)**