

**30.17 METAL WORK (445)**



**MANYAM FRANCHISE**  
Discover! Learn! Apply

**30.17.1 Metal Work Paper 1 (445/1)**

1. (a) **SAFETY PROCEDURES**  
Wipe the blade clean before use  
Oil the blades fold into case after use  
Don't force blades into gaps  
Avoid overtightening locking screw.  
Don't expose to heat or corrosive substances  
Do not detach blade from set.

Any 4 x ½

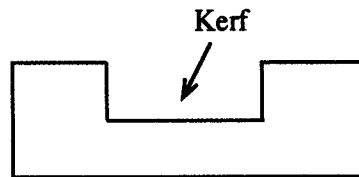
- (b) (i) Gross pay is all payment due before any deductions while net pay is payment due after all deductions.  
(ii) Change is transaction involving exchange of different denominations of equal amount while balance is the amount due after purchase of good or payment of services.

2 x 1

2. (a) **REASON**  
To minimize clogging the teeth of the file

1 x 1

- (b) **KERF**



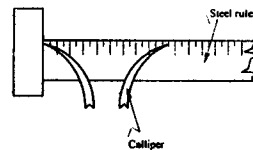
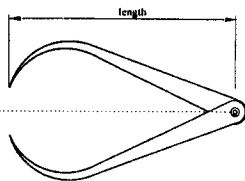
Is the width of a cut produced by the setting of the teeth of a saw blade.

(1½ marks)

3. (a) **MARKING OUT TOOLS**  
Surface plate or scribing block  
Steel rule  
Angle plate.

3 x ½

4. **OUTSIDE CALIPERS**



5. (a) **CHIPPING ANGLE**  
Too large clearance angle makes tool point to 'dig' into the work while too small clearance angle tend to cut thin material or slapping.

2 x 1

- (b) **TWIST DRILL WITH UNEQUAL LIPS**  
Excessive wear  
Rough hole and out of round  
Overheating  
Breakage of drill  
Oversize hole

Any 4 x 1

6. (a) **TINPLATING AND GALVANISING**  
 Tinplating is coating mild steel sheets with tin while galvanizing is coating mildsteel sheets with Zinc. 2 x 1

(b) **METHODS OF GALVANIZING**  
 Hot dipping where cleaned and flux coated sheets are dipped in bath of molten tin/zinc.  
 Spraying with metallic coating of tin or zinc. 2 x 1

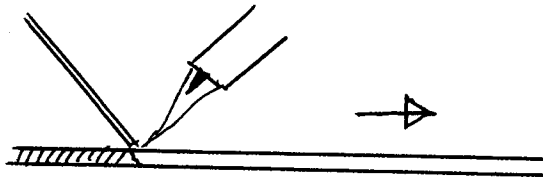
7. (a) **SOFT HAMMER HEADS**  
 Copper  
 Lead  
 Raw hide  
 Plastic  
 Wood Any 4 x 1

(b) **TYPES OF HAMMERS**  
 Stretching hammer  
 Raising hammer  
 Planishing hammer 3 x ½

8. (a) **DEFINITIONS**  
 Spelter: the copper and zinc alloy used in joining.  
 Capillary Action; the attraction of molten metal into the joint.

(b) **FORGE**  
 (i) Bricks for good heat retention  
 (ii) Sparks and smoke would not be arrested causing discomfort in working areas.  
 (iii) Water bosh containing water for cooling the tuyeres. 3 x 1

9. (a) **RIGHTWARD WELDING TECHNIQUE**



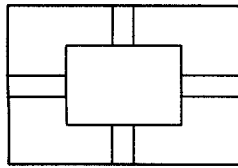
(b) **ADVANTAGES**

Provides better view while welding hence better joint  
 Produces less brittle joint as flame anneals joint  
 Provides better penetration as parent metal is pre-heated  
 Faster than leftward hence less gas used.

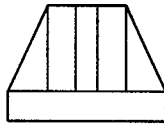
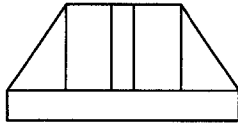
2 Marks

Any 3 x 1

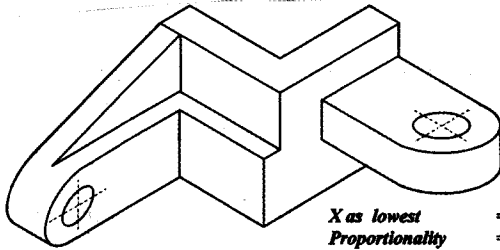
10.



*Correct F. E., E. E. & Plan (3 x 1 ½)* = 4 ½  
*Correct angle of projection* = ½  
**TOTAL** = 5 marks

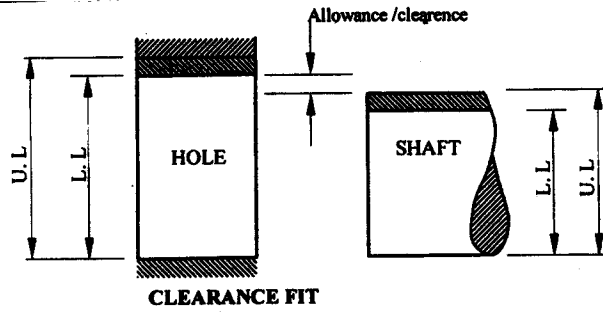


11.

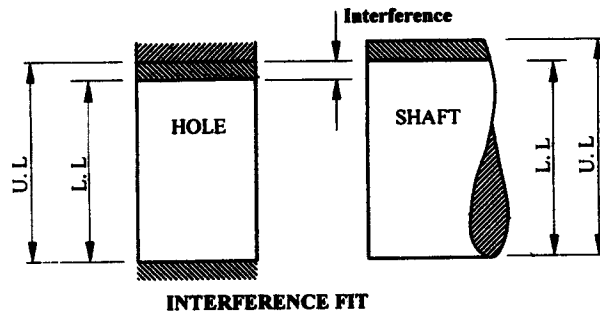


*X as lowest* = 1  
*Proportionality* = 1  
*10 faces @ 1* = 10  
*2 holes @ 1* = 2  
*2 centrelines @ ½* = 1  
**TOTAL** = 15

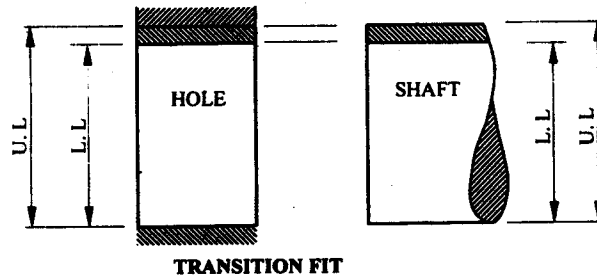
12. (a) TYPES OF FITS



**CLEARANCE FIT**  
(3 marks)



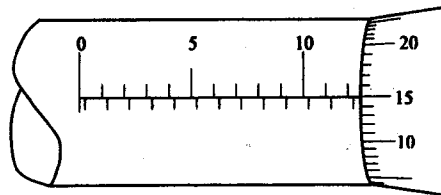
**INTERFERENCE FIT**  
(3 marks)



**TRANSITION FIT**  
(3 marks)

(b)

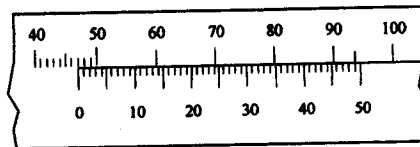
(i)



Main scale 1 mark  
Thimble 1 mark  
Correct reading 1 mark

(ii)

Main scale 1 mark  
Vernier scale 1 mark  
Correct reading 1 mark



13. (a)(i) LACQUERING

- Clean the surface/article  $\frac{1}{2}$
- Warm the article  $\frac{1}{2}$
- Apply the lacquer using brush from centre endwards  $\frac{1}{2}$
- Apply to dry in a warm dust free room  $\frac{1}{2}$
- Apply a second coat and allow to dry  $\frac{1}{2}$

5 x  $\frac{1}{2}$

(ii) PREPARING FOR PLANISHING

- Anneal the article ½
- Pickle the article ½
- Buff with polishing compound ½
- Wash and dry the article. ½

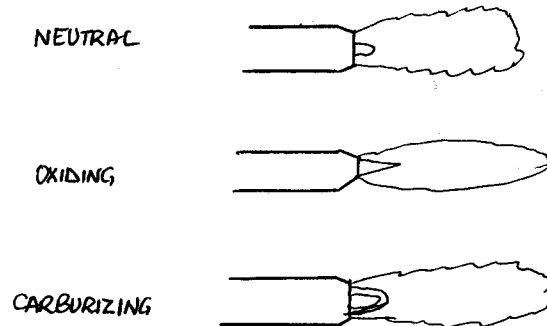
4 x ½

(iii) PLANISHING

- Position the article on planishing stake
- Gently hammer from centre of article outward
- Rotate article while hammer continues
- Ensure hammer marks overlap slightly.

4 x 1

(b)



1½ x 3

(ii) TESTING EQUIPMENT FOR LEAKS

- Close the torch needle valve ½
- Pressurise the system by opening the valves ½
- Apply soapy water on all the valves and any other suspected areas ½
- Look for bubbles to determine any leakage. ½

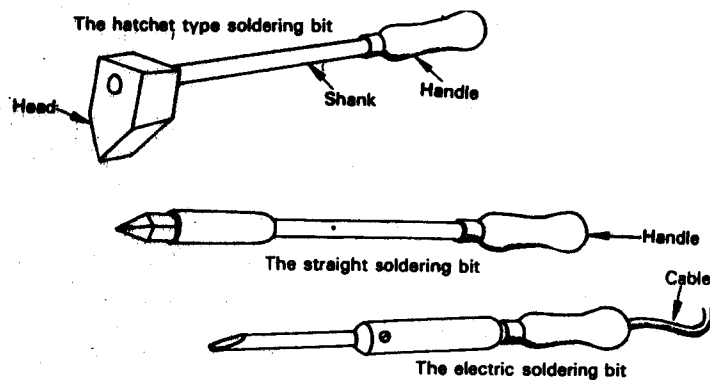
4 x ½

14. MAKING TROWEL

- Mark out the holes and other dimensions
- Cut out the blade and file to shape.
- Drill one hole on the blade
- Form the blade to shape on the anvil beak
- Heat and draw down the tang
- Bend the tool position of the tang to required measurement
- Head and flatten the end to be riveted to 3 mm thick
- File and mark for drilling
- Centre punch the two holes and drill
- Align blade to tongue and rivet on hole
- Drill the remaining hole and rivet
- Debur the work

Steps	12 x ½
Appropriate sketches	Any 5 x 1
Corrected tools listed	8 x ½
TOTAL =	15 marks

15. (a) SOLDERING BITS



ANY 2

Sketches 2 x 1  
Labelling 2 x ½

(b) (i) MARKING OUT THE OPENER

Curved end: Establish the datum edge  
Mark the round end  
Mark R II and dot punch

Slot: Mark the two centres and dot punch  
Mark and scribe curved ends  
Joint the tangents and dot punch

Mouth: Mark centre and punch  
Mark the mouth strip width (5 mm)

Curvatures: Prepare template  
Align, mark and dot punch.

4 marks

(ii) SHAPING

Curved end: Drill  $\phi$  10 hole  
Cut and remove excess materials  
File to shape the curved end.

Slot: Drill  $\phi$  10 holes on both ends  
Chain drill  
Chise out  
File to size and shape

Mouth: Drill  $\phi$  12 hole  
Cut out  
File strip to width and shape

Curvatures: Make relief cuts  
Chise/cut  
File to shape

4 marks

(iii) RESISTANT TO WEAR

Heat to cherry red and dip in carbon rich solution  
Quench in water/oil

1½ marks

(iv) OIL BLACKING

Clean to obtain smooth surface  
Heat to red hot  
Coat with clean oil  
Heat and let cool  
Wipe to clean

2½ marks