

# Solution

①

Supplementary exam (MFT) 22/07/2022

Q.1

a) classification - 3M  
Advantages & limitations of two processes → 2M } 5M

b) Explain metal forming - 1M  
Effect of temperature - 2M  
Effect of strain rate - 2M } 5M

c) At least 7 points → 5M

d) Explain deep drawing → 1M  
Defects → 2M  
Remedies → 2M } 5M

Q.2

a) Classification → 2M  
4 advantages → 2M.

b) Draft in rolling ( $\Delta H_{max}$ )

$$\Delta H_{max} = \mu^2 R$$

where,

$\mu$  = coefficient of friction at the roll-work interface.

$R$  = radius of roller

$\Delta H = H_1 - H_2$  (in one pass of rolling)

$$\therefore \Delta H_{max} = \mu^2 R = (0.15)^2 \times 350 = 7.875 \text{ mm.}$$

$\therefore$  In one pass of rolling operation 7.87 mm of thickness is reduced. → ①

$$\text{Total reduction required} = H_{\text{initial}} - H_{\text{final}} = 50 - 25 = 25 \text{ mm.} \rightarrow ①$$

$$\therefore \text{No of passes required} = \frac{\text{Total reduction}}{\text{Reduction in one pass}} = \frac{25}{7.87} = 3.17 \rightarrow ②$$

$$\therefore \text{No of passes required} \approx \underline{\underline{4}}$$

Q2

c)  $\Delta h = 20 - 18 = 2 \text{ mm}$

$L_p = \sqrt{R \Delta h}$   
 $= \sqrt{250 \times 2} \rightarrow 1 \text{ M}$   
 $= \underline{\underline{22.36 \text{ mm}}}$

$\gamma_p' = 300 \text{ MPa}$

Rolling Force (F) =  $\gamma_p' \times L_p \times w_m \rightarrow 2 \text{ M}$   
 $= 300 \times 22.36 \times 100$

(F) = 670.8 x 10<sup>3</sup> N

Rolling Power is given by,  $P = 2\pi r N F L_p$   
 $= 2\pi \times 10 \times 670.8 \times 10^3 \times 22.36 \times 10^{-3}$   
 $= 942.42 \times 10^3 \text{ (N-m/min)}$   
 $= 15,707 \text{ (W)}$   
 $= 15.7 \text{ kW} \rightarrow 3 \text{ M}$

Q2 d) Defects  $\rightarrow 3 \text{ M}$

Causes & remedies  $\rightarrow 3 \text{ M}$

Q3 a) Explain upsetting  $\rightarrow 2 \text{ M}$   
Applications  $\rightarrow 2 \text{ M}$

b) Diag  $\rightarrow 2 \text{ M}$   
Exp  $\rightarrow 2 \text{ M}$

c) Causes defects  $\rightarrow 3 \text{ M}$

Q.3d) Classify → 2M.

Comparison 6 points → 4M.

Q.4 a) Differentiate 6 points → 4M

b) Advantages 8 limitations → 4M.  
↓ 2M                      ↓ 2M

c) Diag → 2M. } 6M.  
Exp → 4M.

d) Classify → 2M. } 6M  
Advantages → 2M  
Limitations → 2M

Q.5 a) Differentiate 6 points → 4M

b) V bending → 2M } 4M  
Edge bending → 2M

c) Explosive farming → 2M. } 6M  
Adv → 2M  
Limitations → 2M

d) Classify → 2M. } 6M.  
Applications → 2M.  
Explain → 2M