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**Question Paper Code : 50870**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Third Semester

Mechanical Engineering

ME 8351 – MANUFACTURING TECHNOLOGY – I

(Common to : Industrial Engineering/Industrial Engineering and  
Management/Mechanical Engineering (Sandwich)/Mechanical and Automation  
Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is shrinkage in casting process? Describe the different stages of shrinkage allowances?
2. What is permeability in casting?
3. What is the difference between constant current and constant voltage transformer?
4. What is resistance welding and list the types?
5. What are the differences between hot working and cold working process?
6. What is closed die forging?
7. Define formability of sheet metal.
8. A 10mm deep cylindrical cup with diameter of 15mm is drawn from a circular blank. Neglecting the variation in the sheet thickness, the diameter of the blank is \_\_\_\_\_
9. What is compression moulding?
10. List the differences between thermoset and thermoplastics.

PART B — (5 × 13 = 65 marks)

11. (a) Determine the dimensions of top and side cylindrical riser for casting aluminium cube of 15cm. Consider the volume shrinkage during solidification to be 6.5%.  
Or
- (b) What are the different types of centrifugal casting available and explain any two type of centrifugal casting processes.
12. (a) In the arc welding process static voltage ampere characteristic of a power source is given by the following equation is  $I^2 = 500(V - 30)$ .
- (i) If the arc characteristics can be represented by  $I = 23(V - 18)$ , determine the power of stable arc. (6)
- (ii) If arc length voltage is related by expression  $V = 20 + 4.5l$ , determine the optimum length for maximum power. (7)
- Or
- (b) Explain electron beam welding process in detail and discuss the disadvantages.
13. (a) Aluminium rod of 6.25mm in diameter is drawn into wire of 5.6mm diameter. The semi die angle is  $10.1^\circ$  coefficient of friction is 0.04, nominal stress is 35MPa, calculate the drawing stress and maximum percentage of reduction that can be given to the material in this situation.  
Or
- (b) Explain the types of rolling process and discuss the defects in the rolled components.
14. (a) A 400mm-long sheet with a cross sectional area of  $300\text{mm}^2$  (see Figure 14.(a)) is stretched with a force,  $F$ , until  $\alpha = 20^\circ$ . The material has a true stress-true strain curve  $\sigma = 700 \times 10^6 \epsilon^{0.3}$ .
- (i) Find the total work done, ignore end effects and bending.
- (ii) What is  $\alpha_{\max}$  before necking begins?

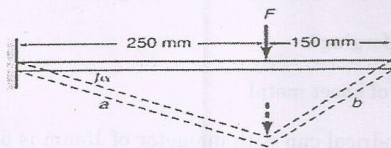


Figure. 14(a)

Or

- (b) Explain the working principle and application of hydro forming process.

15. (a) Which type of process used to fabricate the 1000 litre Plastic (Polyethylene) water tank. Explain in detail with step by step procedure, allowances and any process calculations required to fabricate the above tank.

Or

- (b) Explain the different bonding methods of thermoplastics with its advantages and disadvantages over each other.

PART C — (1 × 15 = 15 marks)

16. (a) Cracked railway track image is shown in Figure. 16(a). Which type of joining process is used for the mitigation of this crack, explain in detail.

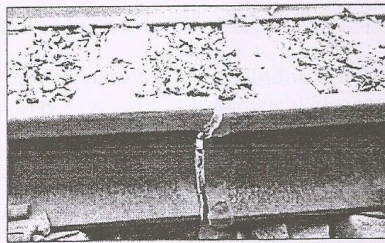


Figure. 16(a)

Or

- (b) One of the Queen Elizabeth's gold ring is attached in Figure. 16(b). Review the design of the ring and explain the process used to make this ring from a gold block.

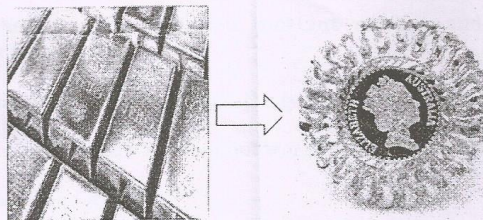


Figure. 16(b)