

**DESIGN & MANUFACTURING***Time: Three Hours**Maximum Marks: 100*

*Answer five questions, taking ANY TWO from Group A, any two from Group B and all from Group C.*

*All parts of a question (a, b, etc. ) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches.*

*Unnecessary long answer may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

- |    |     |   |   |
|----|-----|---|---|
| 1. | (a) | What is ergonomics ? How is this considered in design?  | 5 |
|    | (b) | What are the modern methods of communicating the design ?   | 5 |
|    | (c) | Discuss the meanings of conceptual design, creative design, adoptive design and variant design.   | 5 |
|    | (d) | Distinguish between brain storming and synectics.   | 5 |
| 2. | (a) | Enumerate the steps in engineering design process and explain.  | 8 |
|    | (b) | What is an optimal design ? What are the methods of mathematical optimization ?   | 6 |
|    | (c) | What is “ need analysis “ Explain with the help of an example. Give one need statement for each of the following: (i) Bicycle (ii) Washing machine                            | 6 |
| 3. | (a) | Explain the investment casting process with neat diagram. Outline some typical applications of this process. What are the advantages and disadvantages of investment casting? | 8 |
|    | (b) | Name the sand moulding methods. Describe these in brief with the help of figures.   | 6 |
|    | (c) | Define the terms: (i) Spruce (ii) Gate (iii) Core (iv) Parting line   | 6 |

4. (a) Explain the following (or differentiate between the following) 8  
(i) Rolling and forging  
(ii) Extrusion and wire drawing  
(iii) Blanking and piercing
- (b) Differentiate between hot and cold working of metal. State their advantages and disadvantages. 6
- (c) Explain extrusion and drawing process. 6

**Group B**

5. (a) Classify the machining processes. Name the operations which can be performed on a lathe machine. 8
- (b) What is surface grinder? 6
- (c) Differentiate between the shaper and planer. 6
6. (a) Briefly describe the following finishing operations: 8  
(i) honing  
(ii) lapping  
(iii) buffing
- (b) What are the advantages of welding joint over other joints? 6
- (c) Explain briefly the purposes of using fluxes in welding. 6
7. (a) Describe the principle of electrochemical machining or electric discharge machining process. Give advantages and limitations of the process. 10
- (b) Describe the electrochemical machining(ECM) process with the help of a neat sketch. State its applications. What is electrolyte and explain its role. 10
8. (a) Define product life cycle. Explain various stages of product life cycle with suitable example. 10
- (b) What do you understand by specifications? At what stage these should be defined during the process of product development? Explain. 10

*Group C*

9. Define the following 20
- (i) Simulation
  - (ii) Information Technology's role in manufacturing
  - (iii) AGVs
  - (iv) Data Base Management System
  - (v) Design by evolution
  - (vi) Various methods of heat treatment of steels
  - (vii) Group Technology
  - (viii) HAZ
  - (ix) Creative, adoptive and variant designs
  - (x) CIM

*(Refer our course material for answers)*

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