

S'12:1 FN:AN 201/AD 301(1401)

**FUNDAMENTALS OF DESIGN AND
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 supple-
mented with neat sketches. Unnecessary long answers 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 product life cycle ? Illustrate various stages
of product life cycle with a suitable example. 8
- (b) Describe the following in detail : 3 × 4
 - (i) Design for reliability
 - (ii) Design for assembly
 - (iii) Design for re-cyclability
2. (a) What are the main requirements to design a pro-
duct ? Explain briefly various steps to be followed
to design a product. 4 + 4

(Turn Over)

- (b) Explain briefly the engineering design process and its structure. 8
- (c) Briefly explain the concept of following with respect to the new product design : 2×2
- (i) Brainstorming
- (ii) Morphological analysis
3. (a) Describe the die casting process. Explain briefly the advantages and disadvantages of die casting process over sand casting process. 12
- (b) List the various characteristics that are required in the dry sand molding. 8
4. Explain the following in brief: 4×5
- (i) Rolling and various types of rolling stand arrangements
- (ii) Advantages and disadvantages of hot and cold rolling
- (iii) Captive foundry
- (iv) Shell molding process.

Group B

5. (a) Draw the Merchant's force diagram and state the assumptions made in its development. 8
- (b) Describe the essential parts of a lathe machine. Explain the various processes that can be performed on a lathe machine. 8
- (c) Differentiate between shaping, planing and slotting as regards to relative tool and work motion. 4

6. (a) Describe the mechanism of material removal in ultrasonic machining with the help of schematic illustrations. 10
- (b) What are the various factors considered in the selection of grinding wheels? How are grinding wheels specified? 10
7. Briefly explain (using neat sketches) the method of joining the metals by the following welding processes. Also, explain the advantages and disadvantages of each process : 4×5
- (i) Thermit welding
- (ii) Submerged arc welding
- (iii) TIG welding
- (iv) MIG welding
8. Write short notes on the following : 4×5
- (i) CAPP
- (ii) Group Technology
- (iii) AS/RS
- (iv) Simulation and modelling

Group C

9. Define/explain the following : 10×2
- (i) AGVs
- (ii) Significance of re-crystalline temperature
- (iii) Sensors and robots
- (iv) Function of cores

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- (v) Uses and application of Information Technology
- (vi) CIM
- (vii) Data Base Management System
- (viii) Differences between soldering and brazing
- (ix) Creative, adoptive and variant designs
- (x) Cold shut defect : causes and remedies.