(*iv*) What is parting line ?

(*v*) What is the significance of recrystallisation temperature in metal forming ?

(*vi*) What is manufacturing logic ?

(*vii*) What do you understand by intelligent robots ?

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 supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

Any missing data 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 are the major stages of engineering design ? Discuss with a suitable example. 8

(*b*) What is the role of need analysis in the design process ? Give one need statement for each of the following : 8

(*i*) Bicycle

(*ii*) Washing Machine

(*iii*) Personal Computer

(*iv*) Private Car.

(*c*) What are the main limitations of the sand casting process and how are they overcome ? 4

2. (*a*) Why is 'clearance' provided in die and punch for blanking and piercing operations ? Explain with neat sketches. 8

(*b*) Distinguish between cold and hot working with respect to principle, advantages and applications. 6

(*c*) What are the distinguishing features between a casting and a pattern ? 6

3. (*a*) What do you mean by design communication ? How does a drawing help to a design engineer to share his ideas ? 8

(*b*) During writing a technical report, what points should be kept in mind for easy communication ? 6

(*c*) What factors govern the selection of manufacturing process for a product ? 6

4. Differentiate between: 5 × 4

(*i*) Piercing and Blanking

(*ii*) Creative Design and Innovative Design

(*iii*) Discrete Manufacturing and Continuous Manufacturing

(*iv*) Physical Reliability and Economic Feasibility.

Group B

5. (*a*) What is the source of heat in resistance welding ? Why is the control of pressure important in resistance welding ? 8

(*b*) Explain briefly the purposes of using fluxes in welding ? 6

(*c*) Why are truing and dressing necessary for a grinding wheel ? 6

6. (*a*) What do you mean by integration ? How does it differ from interfacing ? What are the basic needs for integration ? 8

(*b*) Explain in detail the integration of CAD and CAM. What is the role of computer in this integration ? 6

(*c*) What are the major benefits derived from group technology concept in manufacturing ? 6

7. (*a*) What is robotic cell ? Draw a robotic cell and label its all parts. 8

(*b*) What are the main elements of an information system ? Distinguish between hard and soft information. 6

(*c*) Giving a suitable example, explain the concept of designing a process for manufacturing integration. 6

8. (*a*) Define cutting velocity, feed and depth of cut as applied to turning in lathes. What major factors are considered while selecting the values of those three machining parameters ? 8

(*b*) Distinguish between: 4

(*i*) Boring and Internal Turning

(*ii*) Shaping and Planning.

(*c*) What is computer aided process planning (CAPP) ? What type of data are required for developing a CAPP system ? Distinguish between variant and generative systems of process planning. 8

Group C

9. Write the *most correct* answer: 1×6

(*A*) (*i*) In which of the following process, the electrode is non-consumable ?

(*a*) Gas welding

(*b*) Arc welding

(*c*) TIG welding

(*d*) Thermit welding

(*ii*) The highest cutting speed is used in

(*a*) Centreless grinding

(*b*) Surface grinding

(*c*) Cylindrical grinding

(*d*) Internal grinding

(*iii*) In the metal forming processes, the stresses induced in the material are

(*a*) less than the yield strength of the material.

(*b*) greater than the ultimate strength of the material.

(*c*) less than the fracture strength of the material.

(*d*) less than the limit of proportionality.

(*iv*) In which process the material is pulled through a die ?

(*a*) Extrusion process

(*b*) Rolling process

(*c*) Wire drawing process

(*d*) Forging process

(*v*) Group technology brings together and organises

(*a*) parts and simulation analysis.

(*b*) automation and tool production.

(*c*) common parts, problems and tasks.

(*d*) None of the above.

(*vi*) Point angle of a twist drill used for drilling hole in mild steel is

(*a*) 118°

(*b*) 90°

(*c*) 180°

(*d*) 0°

(*B*) Answer the following: 2×7

(*i*) How are electrodes specified ?

(*ii*) Define the term deep drawability.

(*iii*) What is 'Bath Tub Curve' ?