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 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*) Discuss the Morris Asimow's seven phases of morphology of design. 7×2

   (*b*) Explain the types of technological innovation. 6

2. (*a*) Discuss the various stages of a product life cycle. 10

   (*b*) Classify manufacturing processes. Briefly discuss each type of process. 10

3. (*a*) Explain how a green sand mould is made for sand casting, with a suitable example. 10

   (*b*) Enlist some pattern-making material. On what basis a pattern-making material is selected ? 5

(c) What are the differences between true centrifugal casting and semi-centrifugal casting? 5

4. (a) Discuss different types of cold drawing processes, with schematic diagrams. 10

(b) When will you select a forging process over other manufacturing processes? Discuss different types of forging processes. 10

Group B

5. (a) Discuss various important components of a centre lathe, with a neat block diagram of a centre lathe machine. 10

(b) During orthogonal turning operation on a workpiece of diameter 120 mm at 100 m/min with rake angle 15°, the width of cut and chip thickness are 0.4 mm and 0.3 mm, respectively. The feed during the operation was 0.2 mm/rev. If the cutting force and thrust force are 1200 N and 300 N, respectively, calculate the shear angle, friction angle, shear stress and shear strain. 10

6. (a) What are the various factors to be considered in selection of a grinding wheel? Discuss each factor in detail. 6

(b) Define resistance welding. What is the source of heat in resistance welding? Describe the sequence of steps in the cycle of a resistance spot-welding operation. 6

(c) Compare and contrast Electro Discharge Machining and Electrochemical Machining processes. 8

7. (a) Discuss how group technology can be applied in manufacturing and in product design. 10

(*b*) Justify the reasons for installing an AS/RS. What are the components and operating features of an AS/RS ? 5 + 5

8. (*a*) What are advantages of computer aided process planning ? Discuss *any two* approaches of computer aided process planning. 10

(*b*) What is a robot end effectors ? Discuss various types of end effectors. Identify some application areas where industrial robots can be applied. 10

Group C

9. Explain the following in brief : 10 × 2

(*i*) Reverse engineering

(*ii*) Quality Function Deployment

(*iii*) Directional solidification

(*iv*) Hot tears

(*v*) Reliability

(*vi*) Shear plane in orthogonal metal cutting

(*vii*) Blanking

(*viii*) Face plate

(*ix*) AGV

(*x*) Brainstorming