

- (b) Discuss with a neat sketch a cup drawing operation. How much clearance is provided between punch and die for such operation?

$$(4 + 3) + (3 + 2) = 12$$

9. (a) Briefly explain the powder metallurgy process with a block diagram.  
 (b) Briefly explain different types of moulds used in injection moulding with a schematic diagram.

$$6 + 6 = 12$$

**PRIMARY MANUFACTURING PROCESSES  
(MECH 2203)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

***Figures out of the right margin indicate full marks.***

***Candidates are required to answer Group A and  
any 5 (five) from Group B to E, taking at least one from each group.***

***Candidates are required to give answer in their own words as far as  
practicable.***

**Group – A  
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**

- (i) Core prints are provided to
  - (a) produce casting with specific surface design
  - (b) form seat to support and hold the core
  - (c) direct the flow of molten material during pouring
  - (d) form trade mark of company on casting.
- (ii) Sand is not used at all in
  - (a) shell moulding casting
  - (b) centrifugal casting
  - (c) die casting
  - (d) investment casting.
- (iii) Filling time with top gating system is
  - (a) greater than that with bottom gating system
  - (b) equal to that with bottom gating system
  - (c) less than that with bottom gating system
  - (d) any one of these.
- (iv) The purpose of runner is to
  - (a) provide venting
  - (b) trap slag
  - (c) support the core
  - (d) none of these.
- (v) Which of the following tool is manufactured by powder metallurgy?
  - (a) High speed steel
  - (b) Sintered carbides
  - (c) High carbon steel
  - (d) Low carbon steel.
- (vi) Bolt heads are made by
  - (a) drop forging
  - (b) upset forging
  - (c) press forging
  - (d) roll forging.

- (vii) For welding two work pieces made of aluminum sheet, the following welding process is preferred  
 (a) metal arc welding (b) gas metal arc welding  
 (c) gas tungsten arc welding (d) carbon arc welding.
- (viii) In electrical resistance welding, when the current passes through the metal, the greatest resistance is at  
 (a) point of contact of electrode and metal (b) surface  
 (c) point of contact of metals to be welded (d) all of these.
- (ix) The process of infiltration in sintered products is to improve  
 (a) porosity (b) dimensional accuracy  
 (c) surface finish (d) coherent property.
- (x) Steel washers are made using simple die and punch by  
 (a) blanking followed by piercing (b) blanking only  
 (c) piercing followed by blanking (d) piercing only.

**Group - B**

2. (a) Why allowances are kept in pattern making? A solid carbon steel block of final dimension of  $100 \times 75 \times 60 \text{ mm}^3$  is to be prepared by green sand casting. Find the dimension of wooden pattern considering the shrinkage allowance as 3%.
- (b) What are the materials that are generally used for preparing patterns?
- (c) What are the various types of in-gates that are normally used in sand casting process, also state its merits and demerits.

$$(2 + 3) + 3 + (2 + 2) = 12$$

3. (a) Calculate the size of a cylindrical riser using Caine's method (height and diameter is equal) to be used for feeding the material for making the slab casting of  $25 \text{ cm} \times 25 \text{ cm} \times 5 \text{ cm}$  with a side riser, casting poured horizontally into the mould.
- (b) Describe the various defects which are likely to be caused in sand casting because of higher pouring temperatures. Specify the advantages of Die casting process over other sand casting processes.

$$6 + (3 + 3) = 12$$

**Group - C**

4. (a) Draw the sketches of butt-welded and fillet-welded joints.
- (b) Mark the following in the sketch (i) fusion zone (ii) weld face (iii) base metal (iv) root opening (v) root face (vi) toe of weld.
- (c) Explain the working principle of an arc welding with a suitable sketch.

$$3 + 3 + 6 = 12$$

5. (a) Distinguish between TIG and MIG.
- (b) Calculate the heat losses in case of two steel sheets of 1.0 mm thickness each are resistance welded in a projection welding with a current of 3000 A for 0.005 second. The effective resistance of the joint can be taken as 100 micro-ohms. The joint can be considered as a cylinder of 5 mm diameter with a height of 1.5 mm. The density of steel is  $0.00786 \text{ g/mm}^3$  and heat required for melting steel is  $10 \text{ J/mm}^3$ .

$$6 + 6 = 12$$

**Group - D**

6. (a) Differentiate between Hot Working and Cold Working of metals.
- (b) Explain how grain sizes are affected due to mechanical working of metals.
- (c) Describe the process of drop forging mentioning the functions of the different parts of the forging die.

$$4 + 3 + 5 = 12$$

7. (a) Explain with suitable diagram the extrusion process of metals. How extrusion of tubes are carried out?
- (b) Differentiate between forward and backward extrusion mentioning their relative advantages and disadvantages.

$$(3 + 3) + 6 = 12$$

**Group - E**

8. (a) Explain with neat sketches Blanking and Piercing operations. Discuss on the clearance to be provided on punch and die for these operations.