

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) Riser is provided in a mould for
 - (a) rapid cooling of casting
 - (b) feeding molten metal against volume shrinkage
 - (c) allowing molten metal to enter the mould
 - (d) releasing entrapped gases.
- (ii) The parts produced by Powder metallurgy
 - (a) are of higher dimensional accuracy
 - (b) cannot be heat treated
 - (c) always require machining
 - (d) none of the above.
- (iii) Mould for die-casting is made of
 - (a) graphite
 - (b) green sand
 - (c) no-bake sand
 - (d) metal.
- (iv) Complex-shaped castings can be produced by,
 - (a) sand casting
 - (b) die casting
 - (c) investment casting
 - (d) centrifugal casting.
- (v) Filler material is not required in the following
 - (a) oxy-acetylene welding
 - (b) arc welding
 - (c) resistance welding
 - (d) submerged arc welding.
- (vi) A taper provided on the pattern for its easy and clean withdrawal from the mould is known as
 - (a) Machining allowance
 - (b) Distortion allowance
 - (c) Shrinkage allowance
 - (d) Draft allowance.

- (vii) For welding the workpieces of aluminium sheet, the following welding process is preferred,
 (a) metal arc welding (b) gas metal arc welding
 (c) gas tungsten arc welding (d) submerged arc welding.
- (viii) The property of sand due to which gas and steam escapes from sand is
 (a) Cohesiveness (b) Permeability
 (c) Adhesiveness (d) Flowability.
- (ix) The process used for producing aluminium collapsible tube in which toothpaste is kept is
 (a) cold forging (b) impact extrusion
 (c) forward hot extrusion (d) press forging.
- (x) Good surface finish and better dimensional accuracy can be achieved in
 (a) cold working process (b) hot working process
 (c) both (a) & (b) (d) none of the above.

Group - B

2. (a) State various allowances in a pattern with suitable sketch and the reason for providing it.
 (b) 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 30 cm × 30 cm × 6 cm with a side riser, casting poured horizontally into the mould.

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

3. (a) Explain any five types of common casting defects in sand casting components.
 (b) What is gating system? What are the components used for gating system and also explain their purpose?

$$5 + (1 + 6) = 12$$

Group - C

4. (a) Show butt-welded and fillet-welded joint. 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
 (b) Discuss on the welding flame of an oxy-acetylene welding torch mentioning the conditions of forming oxidizing and carburising flames along with their temperature and application.

$$6 + 6 = 12$$

5. (a) With a schematic diagram describe gas metal arc welding (GMAW) process. Explain the sequence of metal transfer that takes place in short circuit/dip transfer method in GMAW.
 (b) Calculate the melting efficiency in case of resistance welding of two sheets of steel of 1.00mm thickness welded in a lap joint with current of 10,000 A for 0.1 sec. The effective resistance of the joint can be taken as 100 micro-ohms. The joint can be considered as a cylinder of 5mm diameter and 1.5mm height. Density of steel is 0.00786 gm/mm³ and heat required for melting steel be taken as 10 J/mm³.

$$6 + 6 = 12$$

Group - D

6. (a) What are the methods in which the roll-separating force could be reduced in cold rolling?
 (b) Compare between forward extrusion process and backward extrusion process.

$$6 + 6 = 12$$

7. (a) List the different stages in drop-forging process in production of a component such as a spanner.
 (b) What do you mean by extrusion ratio? Discuss briefly the mechanism of Extrusion.

$$6 + (2 + 4) = 12$$

Group - E

8. (a) Describe blanking and piercing processes performed in a press work.
 (b) Compare between Progressive and Compound die operation.
 (c) Giving an example explain blow moulding process applied to thermoplastic materials.

$$4 + 4 + 4 = 12$$

9. (a) Discuss the Powder Metallurgy process of making products mentioning the various stages of the process.
 (b) How metal powders are produced? Also write names of the equipment used for producing them.

$$6 + 6 = 12$$