MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : ME-403

PRIMARY MANUFACTURING PROCESS

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) 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.

ii) Metallic chaplets are used in a mould to
   a) enhance directional solidification
   b) increase the velocity of liquid metal
   c) support the core
   d) all of these.

iii) Fuller, punch, swages are the tools used in
   a) Rolling
   b) Forging
   c) Welding
   d) Punching.

iv) The purpose of runner is to
   a) provide venting
   b) trap slag
   c) support the core
   d) none of these.

v) Mild steel wire of 6 mm diameter is made by
   a) Rolling
   b) Forward extrusion
   c) Backward extrusion
   d) Drawing.

vi) In fusion welding, penetration is the ratio of
   a) width of the weld to its depth
   b) length of the weld to its depth
   c) depth of the weld to its width
   d) depth of the weld to its length.

vii) In a rolling process, roll separating force can be decreased by

a) reducing the roll diameter

b) increasing the roll diameter

c) providing back-up rolls

d) increasing the friction between the rolls and the metal.

viii) The events that take place consecutively during the heating process are

a) Recvery, Recrystallization & Grain growth

b) Grain growth, Recovery & Recrystallization

c) Recrystallization, Recovery & Grain growth

d) Recovery, Grain growth & Recrystallization.

ix) Which of the following welding processes is used for welding of sheet metals in automobile and aircraft industries ?

a) Shield metal arc welding

b) Gas tungsten arc welding

c) Thermit welding

d) Resistance welding.

x) Which of the following types is not fillet weld ?

a) butt joint b) lap joint

c) *T*-joint d) corner joint.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Write down the advantages of die casting over centrifugal casting.

3. What is "forgeability" ? What do you understand by 'draft' on forgings and why is it provided ? 2 + 3

4. Describe briefly the 'extrusion defects'.

5. What is braze welding ? Differentiate between soldering and brazing. 2 + 3

6. What is Electroslag Welding ? Write down the applications of electroslag welding process.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Describe basic mechanism of solidification of pure metals and alloys.

   b) Write the names of different casting defects. Describe hot tear and blow and their remedies.

   c) Calculate the permeability number of sand if it takes 1 min 25 s to pass 2000 cm^3 of air at a pressure of 5 g/cm^3 through the standard sample.

   5 + 3 + 4 + 3

8. a) What is aspiration effect ? Prove that sprue should be tapered.

   b) Describe sweep pattern and gated pattern with neat sketches.

   c) Describe investment casting process. 1 + 5 + 4 + 5

9. a) Classify rolling mills with suitable sketches. What are the functions of back-up rolls ?

   b) Enlist different types of forming defects and explain any one of them.

   c) A strip with a cross-section of 150 mm × 6 mm is being rolled with 20% reduction of area, using 400 mm diameter steel rolls. Before and after rolling, the shear yield stress of the material is 0·35 kN/mm^2 and 0·4 kN/mm^2, respectively. Calculate (i) the final strip thickness (ii) the average shear yield stress during the process (iii) the angle subtended by the deformation zone at the role centre (iv) the location of the neutral point. Assume the coefficient of friction to be 0·1. 2 + 2 + 3 + 8

10. a) Describe the causes and remedies of different types of welding defects.

    b) With the aid of sketch explain the process of TIG.

c) Explain with neat sketches the process of submerged arc welding process and its applications.

4 + 5 + 6

11. a) Distinguish between brazing and soldering.

b) Explain laser beam welding and friction welding with suitable sketches.

c) In a butt welding process using arc welding, the arc power is found to be 2·5 kVA. The process is used to weld two steel plates, each of 3 mm thickness as shown in figure 1. Determine the maximum possible welding speed. It is assumed that the metal transfer is of short circuit type and the arc is on for 85% of the total time, $\alpha_{steel} = 1 \cdot 2 \times 10^{-5}$ m^2/sec, $K_{steel} = 43 \cdot 6$ $W/m^\circ C$. Melting point of steel = 1530°C and ambient temperature 30°C.

2 + 8 + 5