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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) Sand is not used at all in

a) shell mould casting b) centrifugal casting

c) die casting d) investment casting.

ii) Hot forging of mild steel blanks should be done at temperature within

a) 200°C to 300°C b) 400°C to 600°C

c) 800°C to 1000°C d) 1400°C to 1600°C.

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iii) In drawing operation the metal flows due to

a) ductility b) work hardening

c) plasticity d) shearing.

iv) Chills are used in casting moulds to

a) achieve directional solidification

b) reduce blow holes

c) reduce freezing time

d) increase the smoothness of the casting surface.

v) The important property of a material in all metal forming process is

a) plasticity b) ductility

c) elasticity d) brittleness.

vi) Which of the following is not a requirement of a good pattern ?

a) It should be light in weight to handle easily

b) It should be smooth to make casting surface smooth

c) It should have low strength to break it and to remove casting easily

d) none of these.

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vii) With increasing rate of plastic deformation, the recrystallization temperature

a) increases b) decreases

c) remains same d) none of these.

viii) In resistance welding, the voltage required for heating is

a) 1 to 5 volts b) 6 to 10 volts

c) 11 to 20 volts d) 50 to 100 volts.

ix) Which of the following processes induces more stress in metal ?

a) Hot rolling b) Swaging

c) Forging d) Turning.

x) Flux is a chemical compound used to prevent the

a) metal from becoming overheated

b) welding rod from freezing to the metal

c) formation of carbon on the metal

d) formation of an oxide on the metal.

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GROUP – B

(Short Answer Type Questions)

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

2. a) What is the difference between brazing and soldering.

b) What is directional solidification ?

c) What should be the property of moulding sand ?

2 + 1 + 2

3. Explain GMAW with proper sketch and its application.

4. a) Describe the method used for determining the permeability of any moulding sand.

b) Explain the application of chaplets. 3 + 2

5. a) Explain how forging improves the mechanical properties of components.

b) What are the specific applications of hydrostatic extrusion ? 3 + 2

6. a) Why is an AC power supply not normally used in TIG welding process ?

b) Why is a neutral flame extensively used in oxy-acetylene welding ? 2 + 3

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GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) A solid carbon steel block of final dimension of $100 \times 75 \times 60\ mm^3$ is to be prepared by green sand casting. Find the dimension of wooden pattern considering the shrinkage allowance as 3% and machining allowance as 5%.

   b) Compare the solidification time of a solid cylindrical casting, a cubical casting and a spherical casting of same material having same volume of casting.

   c) Briefly discuss the different components of a Gating system with a neat sketch. 4 + 7 + 4

8. a) Describe the complete step by step procedure of investment casting. What are the main advantages of investment casting ?

   b) Explain with necessary figure the steps of shell mould casting process.

   c) Discuss briefly the remedies of any two casting defects. 6 + 4 + 5

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9. a) Explain the principle of rolling with a neat sketch. Describe with sketches different kinds of rolling mills.

   b) In a rolling process, sheet of 25 mm thick is rolled to 20 mm thickness. Roll is of diameter 600 mm and rotates at 1000 rpm. Calculate roll strip contact length.

   c) Estimate the blanking force to cut a blank of 25 mm wide and 30 mm long from a 1·5 mm thick metal strip, if the ultimate shear stress of the material is $450\ N/mm^2$. Also determine the work done if the percentage penetration is 25% of the material thickness. 5 + 5 + 5

10. a) Determine the die and punch sizes for blanking and piercing a circular disc of 20 mm diameter from a C20 steel sheet whose thickness is 1·5 mm. Also determine the amount of punching force and striping force associated with the process. Assume shear strength of annealed C20 steel as 294 MPa.

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b) Discuss on drop forging method with necessary figure.

c) Compare between closed die forging and open die forging. 5 + 5 + 5

11. a) List out the factors on which the selection of welding process depends.

b) Explain the Electron Beam Welding with a sketch. 5 + 10

12. a) Explain with neat sketches the process of sub-merged are welding process and its applications.

b) Differentiate between Punching and Blanking with neat sketch.

c) Write down the principle of rolling showing sketches of roll arrangement. 5 + 5 + 5

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