Ref. No. : Ex/PG/MEC/PE/T/122L/2025

M.E. MECHANICAL ENGINEERING FIRST YEAR SECOND SEMESTER - 2025

Subject : ADVANCED MANUFACTURING SCIENCE

Time :3hours

Full Marks : 100

Answer Any Five questions

(Assume any data if needed)

Q1 a) What is aspiration effect in casting?

b) with a neat sketch, show full arrangement of MIG welding, the type of inert gas used in the process and the application. [5+15]

Q2 a)A strip with a cross-section of 150 mm x 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 0.35kN/ mm^2 and 0.4 kN/mm^2 respectively.

Calculate

(i) the final strip thicknesses

(ii) the average shear yield stress during the process

(iii) the angle subtended by the deformation zone at the roll centre

(iv) the location of the neutral point θ_n.

Assume the coefficient of friction to be 0.1. [15+5]

b)What is gating system? Also explain their purpose.

Q3. a) The voltage length characteristic of direct current arc is given by (V = 20 + 40L) volts, where L is the length of the arc in cm. The power source characteristic is approximated by straight line with open circuit voltage = 80 V and a short circuit = 1000 amp. Determine the optimum arc length and the corresponding arc power

b) Explain brazing and soldering process.

[15+5]

Q4. a) Name the possible welding defects and state their causes and possible remedies.

[Turn over

b) What is the full form of NDT? Explain X-ray radiographic testing process. [15+5]

Q5. a) Name the possible casting defects and state their causes and possible remedies.

b) In a gating system design, a down sprue of 180 mm length has a diameter of 20 mm at its top end. The liquid metal in the pouring cup is maintained up to 60 mm height. What should be the diameter (in mm) of the down sprue at its lower end to avoid aspiration?

[15+5]

Q6. Two gating designs for a mould of 50cm x 25cm x 15cm are shown in Fig.1 . The cross section area of gate is 5cm^2. Determine the filling time for both the designs. [20]

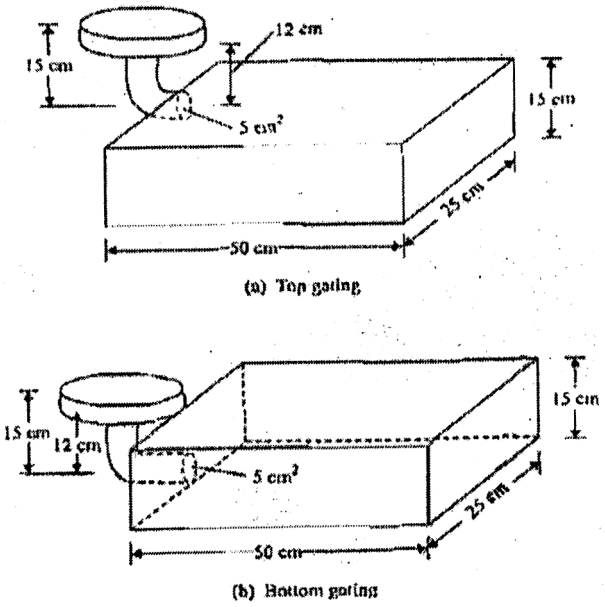

Fig.1

Q7. a) What is pattern? Describe different types of pattern allowances.

b) Explain with neat sketches the process of investment casting and its application.

c) Explain the process of Thermit welding process and its application.

[5+5+5]