BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING EXAMINATION, 2022

(2nd Year, 2nd Semester)

MANUFACTURING PROCESS

Time : Three hours   Full Marks : 100

Answer five (05) question taking at least two (02) from each part

PART-A

1. (a) With adequate figures discuss stepwise the shell molding process.

    (b) Which one will be the ideal riser amongst three different geometrical shapes with equal volumes? Discuss mathematically and justify your answer considering any three such geometrical shapes.

    (c) Why sprue pins are made tapered? Discuss with adequate figures.

    (d) Write brief notes on: (i) pattern maker's rule (ii) magnetic inspection of cast part (iii) hard spots.

    (e) Write an explanatory note on casting cleaning.   [6 + 5 + 3 + 6 = 20]

2. (a) Draw a labeled diagram (only drawing) of Cupola Furnace

    (b) Discuss the sand property, 'Acid Demand Value'.

    (c) Drawing a figure discuss about 'skim bob'.

    (d) How venting is done?

    (e) Show the positions of external chills in case of a cross joint.   [5 x 4 = 20]

3. (a) A cast iron cylinder of 450 mm outside diameter, 75 mm inside diameter and 150 mm long is to be obtained by sand casting. Assuming only shrinkage allowance, calculate the dimensions of the pattern of plain carbon steel. If the master pattern is to be made of aluminium then calculate the dimensions of the wooden pattern which is to be used for making the aluminium pattern.

    for steel the shrinkage allowance is 21.0 mm/m.

    for aluminium the shrinkage allowance is 13.0 mm/m. (Sketch the diagram)   [10]

    (b) Deduce the formulae to calculate the time to fill up the mould cavity by bottom gate system.   [10]

[Turn over

4. (a) Discuss briefly about required properties of moulding sand.
(b) What are the specific applications for the following pattern materials: wood, metal and plastics?
(c) Define terms core, core prints, chaplets and chills (with diagram).

[8 + 6 + 6 = 20]

PART-B

5. (a) Discuss with adequate diagrams, the lifting mechanisms of drop forging hammer.
(b) Define 'pancaking', 'forgeability', 'parting plane' and 'flow lines' in forging operation.

(d) Mentioning in detail about bend length and die opening sizes, state the formula to calculate the bending force.
(e) Write a brief note on hydrostatic extrusion. [6 + 6 + 4 + 4 = 20]

6. (a) With an explanatory figure discuss about a welding process where chemical reaction is considered as the heat source.
(b) How acetylene gas is preserved in gas cylinder? Why copper is not to be used in presence of acetylene?
(c) What is meant by 'HERF'? Mentioning the advantages and limitations give some examples of HERF.
(d) Write a brief note on 'rotary tube piercing'.
(e) Defining the term 'additive manufacturing' write an explanatory note on **either** SLS **or** stereolithography. [5 x 4 = 20]

7. (a) What is forming process? Write difference between hot working and cold working process.
(b) Explain: Rolling Drawing, Deep drawing, Bending (with diagram).
(c) Explain: swept pattern and skeleton pattern.
(d) Calculate the permeability number of sand if it takes 1 min 30 s to pass 2000 cm^3 of air at a pressure of 6 g/cm^2 through the standard sample. [8+ 6 + 3 +3 = 20]

8. (a) Define & classify welding process.
(b) Compare straight polarity and reverse polarity with diagram.
(c) Explain in details: Tungsten Inert Gas Welding Process (TIG) with diagram.
(d) What is duty cycle? [3+ 6 + 9 +2 = 20]