BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE PILANI
Second Semester 2022-23
Manufacturing Processes (ME F219)
Mid Semester Test (Regular, Open Book)
Date: 18-03-2023

Maximum Time: 90 min.   **Maximum Marks: 60**

Note: Be succinct, no credit will be given for ambiguous answers. All parts of a question must be answered together and in sequence. Answer of a question must be started from a fresh page.

Q1.

a) Match the following entities for a correct pair (1:1).   [5]

1) Bolt thread	a) Shape rolling
2) Steel bowls	b) Thread rolling
3) I-beam	c) Deep drawing
4) Eye bolt	d) Metal spinning
5) Cymbals	e) Forging

b) Write down your answer **briefly**.   [15]

i) How do you withdraw the drag pattern from the mold part during mold making process using split pattern?
ii) What is the role of G-factor in true centrifugal casting?
iii)Why are near-net-shape parts produced in squeeze casting?
iv) Why is uneven interior surface obtained from slush casting?
 v) How is non-axisymmetric and irregular object obtained from centrifugal casting?

Q2.

a) Write down the causes and remedies of the following manufacturing defects   [10]

SL No	Name of defects	Causes	Remedies
1	Wash and cut		
2	Drop		
3	Misrun		
4	Hot spot		
5	Buckles		

b) Write down two major differences in **tabular form.**   [10]
      i) Core vs. Core print
      ii) Flowability vs. Friability
      iii) Strainer core vs. Splash core
      iv) Vertical gate vs. Horizontal gate
      v) Lost foam vs. Lost wax

Q3.

a) A C20 steel sheet metal channel as shown in Fig.1 is to be made through bending operation The thickness of the sheet metal (t) is 4 mm. Calculate the total length of metal sheet required initially for the bending operation with suitable sketch. The value of k used for the location of neutral axis with respect to inside surface of bend area can be assumed as 0.33 when $R < 2t$ and 0.5 when $R > 2t$. All these parameters bear their usual meaning.   [4]
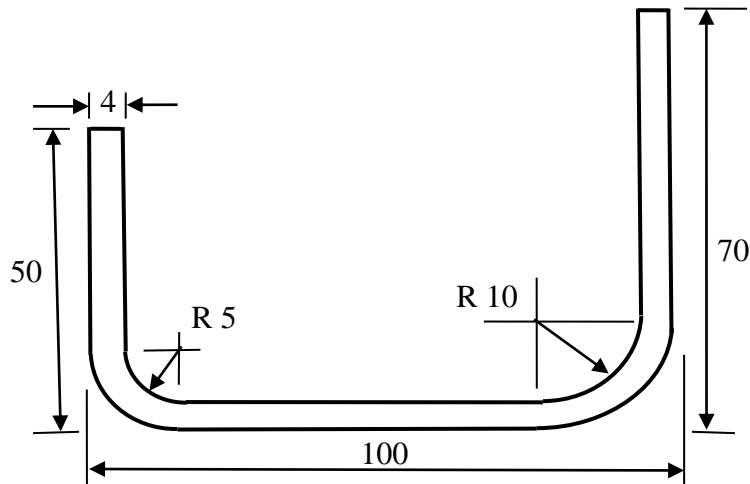
Fig.1 Sheet metal channel

b) A cylindrical riser is to be used for a sand casting mold. For a given cylinder volume, determine the dimeter to height ratio $\left(\frac{D}{H}\right)$ which will maximize the time to solidify.   [4]

c) A continuous hot rolling mill has eight stands. The thickness, width and length of the starting slab are 3 in, 15 in and 10 ft respectively. The final thickness of the slab is to be 0.3 in. The roll diameter at each stand is 36 in, and rotational speed at stand number 1 is 30 rev/min. It is observed that the speed of the slab entering stand 1 is 240 ft/min. Assume that no widening of the slab occurs during the rolling sequence. The percent reduction in thickness is to be equal at all stands, and it is assumed that the forward slip will be equal at each stand. Determine: (a) percent reduction at each stand, (b) rotational speed of the rolls at stands 2 through 8, and (c) forward slip. (d) What is the draft at stands 1 and 8? (e) What is the length and exit speed of the final strip exiting stand 8?   [12]

***************************Best of luck****************************