



NAVRACHANA UNIVERSITY

School: School of Engineering and Technology
 Program/s: B.Tech Mechanical
 Year: 3rd Semester: 1st
 Examination: End Examination
 Examination year: November 2023

Course Code: ME 301 Course Name: Manufacturing Technology 2
 Date: 24/11/2023
 Time: 13:00 pm to 15:00 pm

Total Marks: 40
 Total Pages: 2

Instructions:

- Write each answer on a new page.
- Use of a calculator is permitted/not permitted.
- * COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping

| Q. No. | Details | Marks | COs* | BTL# | | | | | | | | | | |
|----------|---|----------|----------|-----------------------------|---|---|----|---|---|---|----|----|-------------|-----------------------------|
| 1 | <p>Evaluate following Statements. Support your answer with appropriate reasons, facts, figures, examples etc.</p> <ol style="list-style-type: none"> Sometimes post heating of weld joint is required. Spherical shape is best suited for riser design. Placement of Chill help in achieving directional solidification. Sometimes the use of chaplets become inevitable during casting process. Casting is preferable manufacturing process to produce complex and intricate shaped products. Permeability is one of the most important property molding sand must possess. Use of wood in making the pattern is very popular casting industry. The vertical face of pattern is kept tapered. The preferable shape of down sprue is vertical tapered. The time required to fill the mold cavity should be as minimum as possible. | 20 | CO1.2 | BT1, BT2, BT4, BT5 | | | | | | | | | | |
| 2 | <p>Solve the following examples.</p> <ol style="list-style-type: none"> Arrange the given material in decreasing order of their amount of solid shrinkage during solidification. Coefficient of Thermal expansion (α) is given in K^{-1}. (2 Marks) <table style="margin-left: 20px;"> <thead> <tr> <th>Material</th> <th>α</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>5</td> </tr> <tr> <td>Q</td> <td>18</td> </tr> <tr> <td>R</td> <td>0</td> </tr> <tr> <td>S</td> <td>23</td> </tr> </tbody> </table> <ol style="list-style-type: none"> The dimensions of cylindrical side riser for a 25 cm× 15cm×5cm steel casting are to be determined. For the tabulated shape factor values | Material | α | P | 5 | Q | 18 | R | 0 | S | 23 | 20 | CO1, CO2 | BT1, BT2, BT3, BT4 |
| Material | α | | | | | | | | | | | | | |
| P | 5 | | | | | | | | | | | | | |
| Q | 18 | | | | | | | | | | | | | |
| R | 0 | | | | | | | | | | | | | |
| S | 23 | | | | | | | | | | | | | |

given below, find the diameter of riser in cm.
(4 Marks)

| | | | | | |
|-----------------------------------|---|-----|------|-----|------|
| Shape Factor | 2 | 4 | 8 | 10 | 12 |
| Riser Volume/Casting Volume | 1 | 0.7 | 0.55 | 0.5 | 0.35 |

3. A cube shaped casting solidifies in 8 min. Find the solidification time in minutes for a cube of the same material, which is 10 times heavier than the original casting. **(4 Marks)**
4. A cubic casting of 50 mm side undergoes volumetric solidification shrinkage and volumetric solid contraction of 4% and 6% respectively. Riser is used. Assume uniform cooling in all directions. Find out the side of the cube after solidification and contraction.

(3 Marks)

5. In sand casting of a hollow part of lead, a cylindrical core of diameter 120 mm and height 180 mm is placed inside the mould cavity. The densities of core material and lead are 1600 kg/m^3 and $11,300 \text{ kg/m}^3$ respectively. Find the net force (in N) that tends to lift the core during pouring of molten metal.

(3 Marks)

6. A direct current welding machine with a linear power source characteristic provides open circuit voltage of 80 V and short circuit current of 800 A. During welding with the machine, the measured arc current is 500 A corresponding to an arc length of 5.0 mm and the measured arc current is 460 A corresponding to an arc length of 7.0 mm. Find out the linear voltage (E) arc length (L) characteristic (in form of $E = a + bL$) of the welding arc (where E is in volt and L in mm).

(4 Marks)

*****End of Question Paper*****