



## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2021

Programme Name: B. Tech ASE

Semester : V

Course Name : Manufacturing Technology

Time : 3 hr

Course Code : MEPD-3010

Max. Marks: 100

Nos. of page(s) : 03

Instructions: Make use of *sketches/plots* to elaborate your answer. Brief and to the point, answers are expected.

Q. No.	Section A ( 5Q x 4M = 20 Marks)	Marks	CO
1	Explain the material selection process for manufacturing a machine unit.	4	C01
2	Discuss the various defects associated with Casting process.	4	C01
3	List down the application of following welding process.  a) TIG b) Arc welding c) Gas Welding d) Submerged arc welding	4	C02
4	Discuss the material removal process in metal cutting operation.	4	C02
5	<p><b>I.</b> The process of making hollow castings of non-circular shape and desired thickness by permanent mould without the use of cores is known as (a) Die casting (b) Slush casting (c) Pressed casting (d) Centrifugal casting</p> <p><b>II.</b> Which one of the following is the correct statement? In a centrifugal casting method (a) No core is used (b) Core may be made of any metal (c) Core is made of sand (d) Core is made of ferrous metal</p> <p><b>III.</b> Turbine blade can be made through centrifugal casting [True/ False]</p> <p><b>IV.</b> Interference fit joints are provided for: (a) Assembling bush bearing in housing (b) Mounting heavy duty gears on shafts (c) Mounting pulley on shafts (d) Assembly of flywheels on shafts</p>	4	C01

**Section B ( 4Q x 10M = 40 Marks)**

6	<p>Discuss the following casting process and their application with neat sketch.</p> <p>a) Continuous casting [03]                  b) Centrifugal casting [03]                  c) Investment casting [03]                  d) Draw the placement of riser with end wall condition [01]</p>	10	C02
7	<p>Calculate the dimensions of hole and shaft from the standard designation 40 H<sub>5</sub> h<sub>7</sub>. Following data are given for references.</p> <ul style="list-style-type: none"> <li>• Geometric mean dimensions = 35 mm</li> <li>• IT5= 7 times of i</li> <li>• IT7= 16 times of i</li> </ul>	10	C03
8	<p>Discuss the section criteria of cutting tool material and based on this criteria compare at least 5 cutting tool material for high production rate criteria.</p> <p align="center"><b>OR</b></p> <p>Discuss the effect of following tool geometry on machining process.</p> <p>a) Positive Back rake angle                  b) Negative Back rake angle                  c) Side rake angle                  d) Cutting edge angle</p>	10	C03
9	<p>Explain the three types of oxy-acetylene flames. Indicate with the help of sketches the various zones, respective temperature ranges and applications of each type of flame</p>	10	C03

**Section C ( 2Q x 20M = 40 Marks)**

10	<p>A) Design of down sprue, avoiding aspiration as shown in the figure to deliver liquid cast iron (density = 7800 kg/m<sup>3</sup>) at a rate of 10 kg/sec against no head at the base of sprue. Neglect the frictional and orifice effects. [10]</p> <p>B) Sketch the pattern with allowances for casting the following articles [10]</p> <p>I. Cast iron Bearing Block [Fig-01]                  II. Aluminum bracket [Fig-02]</p>	20	C04
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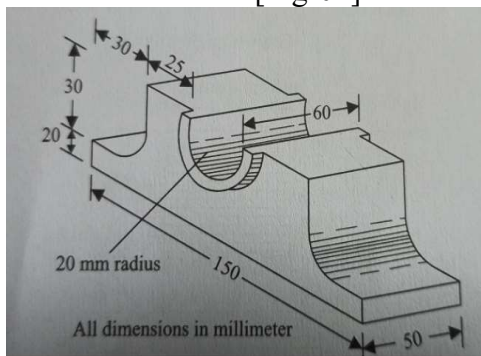


Fig-01

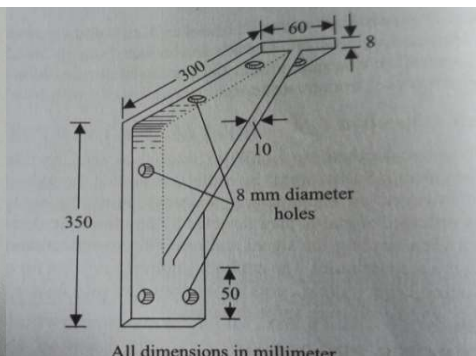


Fig-02

11

A XYZ company want to launch a new car in which some of following parts (shown in the figure) wants to manufacture inhouse.

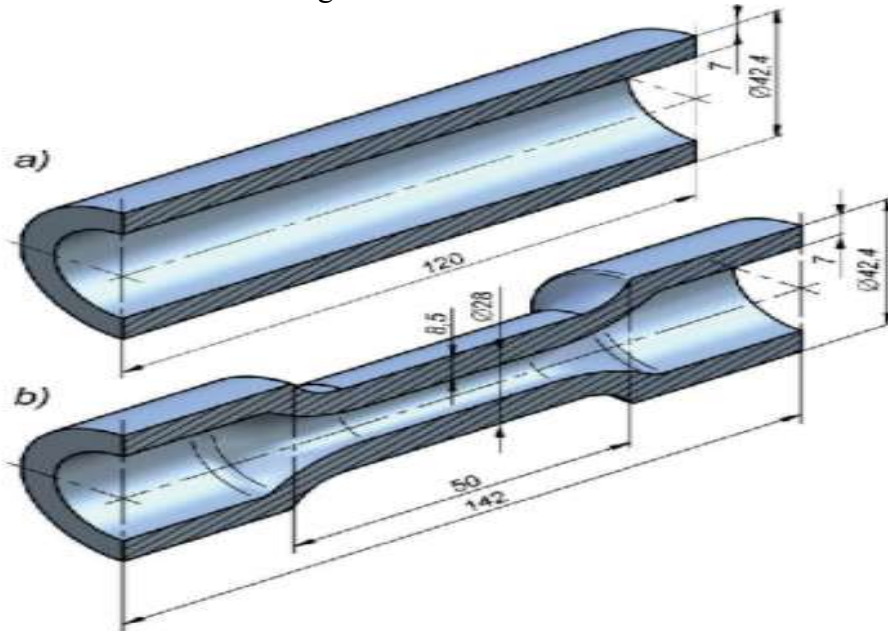
a. Hollw and step shaft

b. Falt surface used at floor dimensions (80 x 60 x 5 Cm)

Analyze the above two component in terms of right selction of manufacturing method as well as tool selection. Following data you can refer for analysis purpose.

- Total number of componemt production – 1000
- Machining Speed variation lies between (N) – 50 to 2000 RPM
- Labour cost per hour – 100 rupees
- For hollow shaft raw material dimension – outside and inside dia 50 and 20 mm respectively .
- Steel plate raw material dimension= (82 c 62 x 6 cm)
- Material used – high carbon steel
- Machining cost per hours- 2000 rupees

Prepare the complete chart for manufacturing selection, total time required for production and total manufacturing cost exclude fixed cost of machine.



OR

A) Discuss the nonconventional positive and negative manufacturing process with atleast 2 example of each with neat sketch. Also explain the salient features over the conventional process. [10]

B) Explain the following machining process with their application in aerospace domain.

I. Milling

II. Shaping

III. Drilling

IV Sheet metal operation

[10]

20

C04