MCP101: PRODUCT REALIZATION BY MANUFACTURING

Minor-1 Exam

MAX MARKS: 50 **MAX TIME: 60 min**

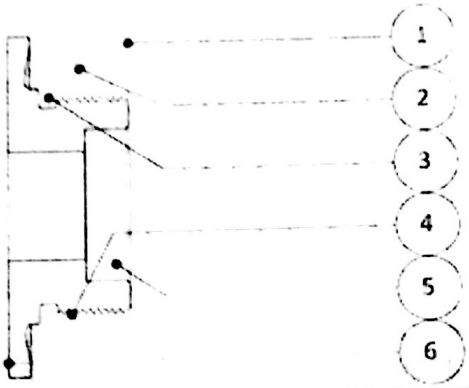
31.375

Important Instructions:

i. Workshop Lab Manual is allowed. Nothing should be written on the manual by hand.

ii. Make suitable assumptions wherever required and state them clearly.

Q1. Identify the machining operations to be done to prepare the below mentioned part from a cylindrical raw blank: **[3 Marks]**



2.3

1.	Facing	2.	Turning	3.	Grooving
4.	Threading	5.	Boring	6.	Facing

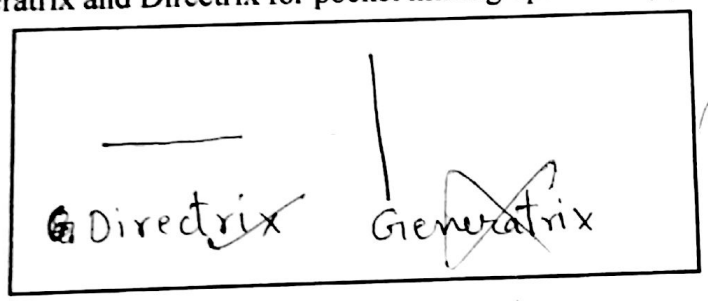
13

Q2. Attempt the following:

i) In CNC Lathe machine, the feed direction while facing is along X Axis and depth of cut is along Z Axis. **(2)**

2

ii) Draw the Generatrix and Directrix for pocket milling operation **(2)**



1

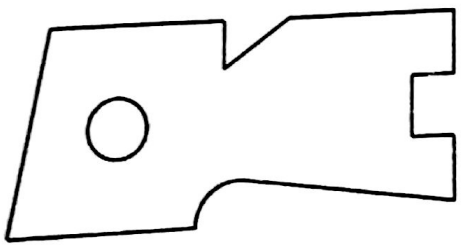
iii) The intermediate shape of the cross-section prepared during forging of Hexagon from a Circular cross-section is _____. **(1)**

iv) The operation to make 8 mm diameter threaded hole in 10 mm thick 40x50 mm mild steel plate is Tapping. **(1)**

1

v) The wooden joint used to make top frame of a study table is _____. **(1)**

vi) Suggest the type of files used to finish below mentioned shape. **(2.5)**



1. Triangular File
2. Round File
3. Square File
4. Flat File
5. Half Round File

2

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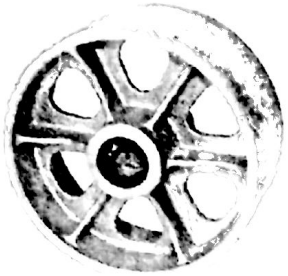
vii) Spur gears can be cut on Broaching Machine. (1)

viii) Operation to sink conical head of a screw in the surface is known as _____. (1)

ix) The machine used for doing operation in (viii) is _____. (0.5)

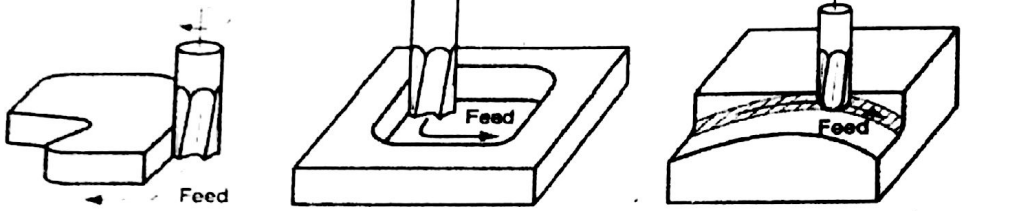
x) A pattern is made for casting flywheel and for making core. Cylindrical core is used to create hole in the middle of the wheel casting. (2)



a) The outer diameter of flywheel pattern is made larger than the final casting diameter.

b) The outer diameter of the core used to make central hole in the casting is made Smaller than the final hole size.

xi) Name the three milling operations shown below: (3)



a) End Milling b) Pocket Milling c) Surface Milling

xii) Write 4 functions of the Gating System in the sand casting process: (4)

a) It helps to feed the Molten Metal properly in the Mould.

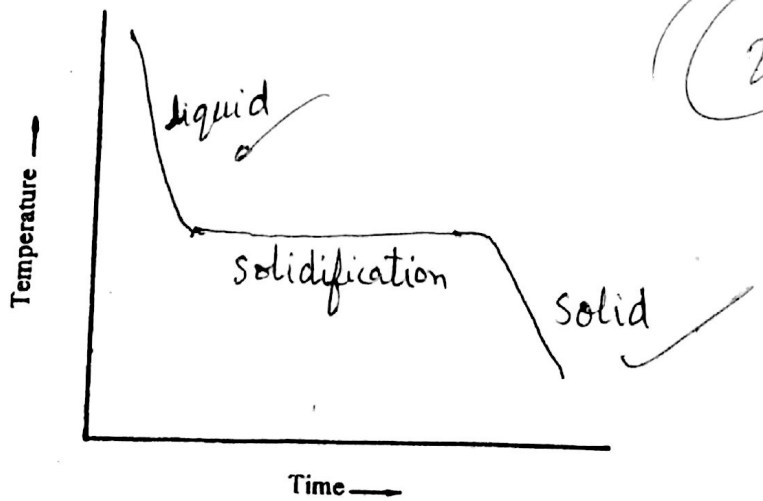
b) In this, Runner is a channel for avoiding turbulance & gas entrapment.

c) In Gates, they connect the Runner to Mould through which Molten Metal flows

d) Riser is used to compensate the shrinkage during solidification of Casting

xiii) Three Files are available in fitting shop of following grades: A = 20, B = 50, C = 70. Suggest the order of use of these files to finish the surface: A, B, C. (1)

xiv) Draw cooling curve of pure metal in the casting process. Label solid and liquid phase on it. Mark the shrinkages taken care of by the riser and the pattern allowance on it. Indicate the solidification time. (1+1+2+1)



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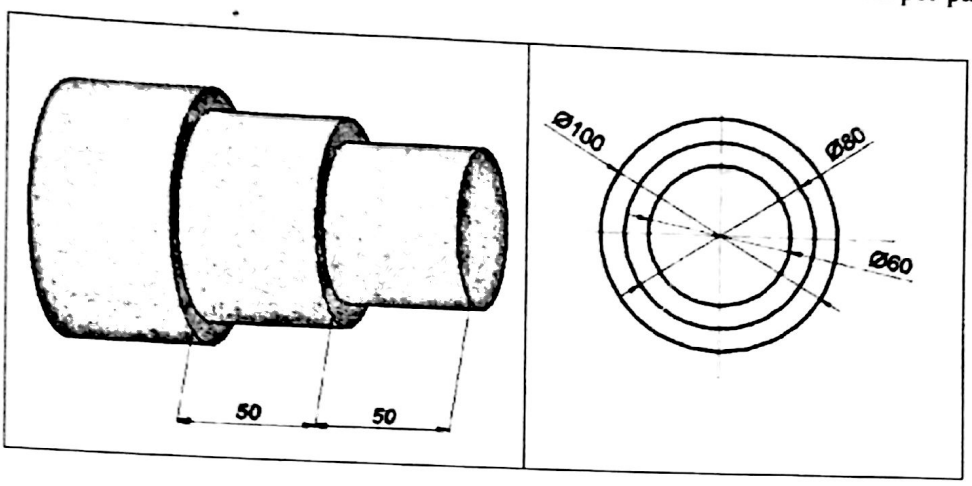
Q3. The part shown below will be turned in two machining steps. In the first step a length of (50 + 50) = 100 mm will be reduced from Ø100 mm to Ø80 mm and in the second step a length of 50 mm will be reduced from Ø80 mm to Ø60 mm. Calculate the minimum machining time T required with the following cutting conditions: Spindle RPM = 255, Feed is f =0.8 mm/rev, Maximum depth of cut = 3 mm per pass. **[8 Marks]**



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Solution:

$$\text{Cutting Time} = \left(\frac{\text{Length Cut} + \text{Allowance}}{\text{Feed Rate} \times \text{Machiene Speed}}\right)$$

From ϕ100mm to ϕ80mm

$$(CT)_1 = \left(\frac{100 + 0}{0.8 \times 255}\right)$$

Total Time taken from ~~cutting~~ Turning ϕ100mm to ϕ80 mm

$$CT_A = \left(\frac{10}{3}\right)(CT)_1 = \left(\frac{10}{3}\right)\left(\frac{100+0}{0.8\times255}\right)$$

From ϕ80mm to ϕ60mm

$$(CT)_2 = \left(\frac{50}{0.8\times255}\right)$$

Total Time taken for Turning from ϕ80mm to ϕ60mm

$$CT_B = \left(\frac{10}{3}\right)(CT)_2$$

Total Time for doing job is $= CT_A + CT_B$

$$= \frac{10}{3}\left(\frac{100+0}{0.8\times255}\right) + \frac{10}{3}\left(\frac{50}{0.8\times255}\right)$$

$$= \frac{10}{3}\left(\frac{150}{0.8\times255}\right)$$

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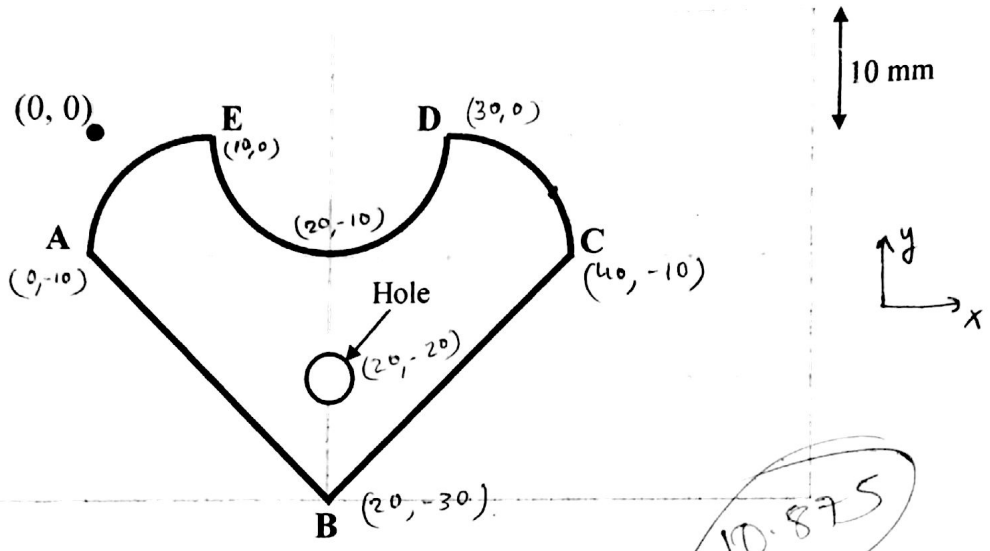
Q4. Write CNC Program to make part shown in the figure below on a milling machine. Start machining from A and do in order A-B-C-D-E-A. End mill cutter dia is 4 mm. The thickness of sheet is 8 mm. The depth of profile cut in the sheet is 5 mm. A through hole is drilled in the end. **[12 Marks]**



10.875

CODE	COMMENTS
G54	Starting CNC Machine
T5 D1 M06	Selecting Tool No. 5
S2000 M03	Setting Speed 2000 rpm & rotate spindle in Clockwise dirn
G00 X0 Y0 Z+5 F200	Positioning above (0,0,0) & Setting feed
G00 Y-10	Positioning at given point
G01 Z-5	Make Blind hole of depth of cut of 5 mm
G01 X20 Y-30	Milling upto given point with slow Speed
G01 X40 Y-10	Milling upto given point with slow speed
G03 X30 Y0 CR10	Making curve design of given Radius in Anti-clockwise dirn
G02 X10 Y0 CR10	Making curve design of given Radius in Clockwise dirn
G03 X0 Y-10 CR10	Making curve design of given Radius in Anti-Clockwise direction
G00 Z+5	Uplifting the Tool upto given height
G00 X20 Y-20	Position at given point
G01 Z-8	Slowly make a through hole
G00 Z+30	Uplifting tool upto given height
M 30	Stop the Machine

Through hole should be ...

Tool should return to origin

7.875

3

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