

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2172002

Date: 02/05/2017

Subject Name: Automated Manufacturing - I

Time: 02.30 PM to 05.00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) The following component is to be made using a CNC Turning Centre equipped with a FANUC OT controller. Write a complete manual part program for machining of the component shown in fig.1. The datum is to be set as shown in fig.1. Take Raw material of size $\phi 90 \times 100$ mm. Limit Maximum spindle Speed to 2500 RPM. **07**

The suggested route sheet is:

SN.	Operation	Tools	Spindle speed RPM	Feed Mm/rev	Remarks
1	Facing (G94)	T01	450 RPM	0.15	On Z=0 face
2	Rough Turning (G90 or G01)	T02	620 RPM	0.20	Max D.O.C 5 mm
3	Finish Turning (G90 or G01)	T02	710 RPM	0.10	Max D.O.C 1 mm
4	Circular cut (G02)	T02	620 RPM	0.20	Max D.O.C 5 mm

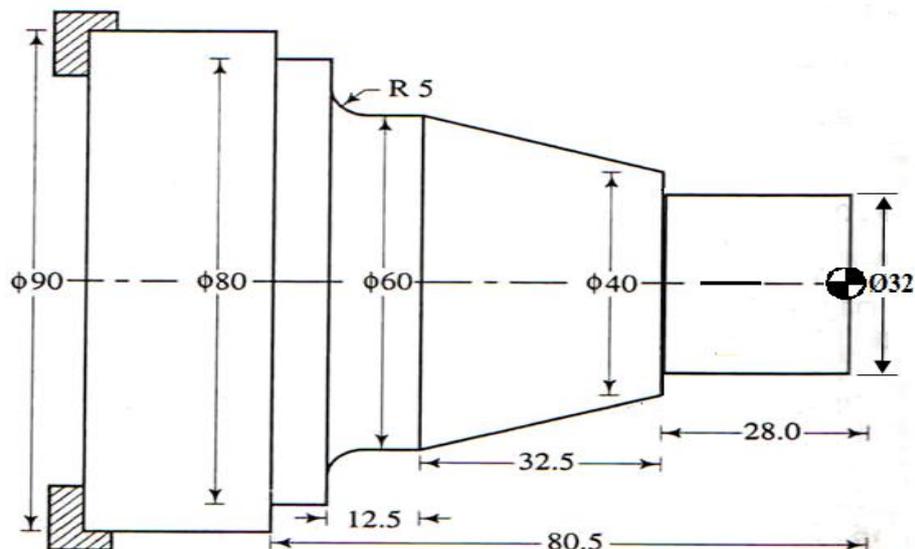


Figure 1. (All Dimension are in mm)

(b) Write a part program to machine the profile as shown in figure.2. Raw material size: $150 \times 100 \times 10$ mm. **07**

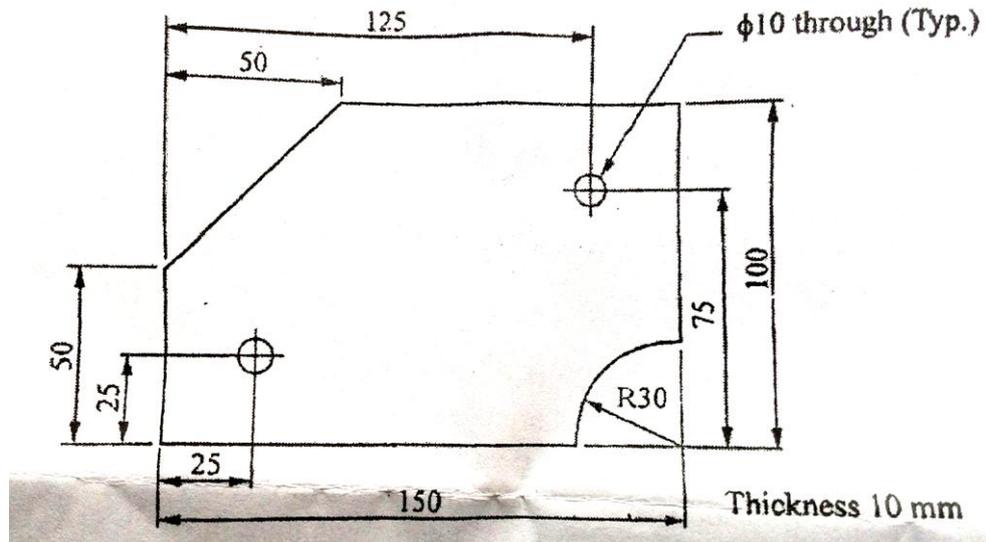


Figure 2. (All Dimension are in mm)

- Q.2** (a) With suitable sketch explain closed loop and open loop control system. **07**
 (b) What is an automation migration strategy? Explain three phase of a typical automation migration strategy. **07**

OR

- (b) The work table of a NC machine is driven by a closed loop positioning system. **07**
 Lead screw pitch is 4 mm and is coupled directly to the motor shaft with gear ratio of 4:1. The optical encoder generates 100 pulses per revolution of its output shaft. The table has been programmed to move a distance of 200mm at a feed rate of 400mm/min.
1. How many pulses are received by the control system to verify that the table has moved exactly 150mm?
 2. What are the pulse rate and the motor speed that corresponds to the specified feed rate?

- Q.3** (a) What is the difference between hard products variety and soft product variety? **07**
 (b) What is ATC? Explain how tool is changed in CNC machine with suitable sketch. **07**

OR

- Q.3** (a) Differentiate between G90 (single pass rectangular cycle) and G71 (multipass rough turning cycle) with help of path profile. **07**
 (b) Define automation and explain three different type of automation. **07**

- Q.4** (a) What is AGV? Explain different types of AGV. **07**
 (b) Using neat sketches, explain the working principle of incremental and absolute optical encoders. **07**

OR

- Q.4** (a) What is process planning? Briefly describe the two basic approaches in computer aided process planning. **07**
 (b) Explain the principle of CMM. Describe the methods of operating and controlling a CMM. **07**

- Q.5** (a) What does the term reverse engineering mean in the context of coordinate measuring machines? **07**
 (b) What is the AS/RS system and carousel system? Explain basic component of automated storage/retrieval system. **07**

OR

- Q.5 (a)** With neat sketch explain the four basic step of rapid prototype techniques. **07**
Describe the Stereolithography(SLA) technology.
- (b)** Explain Machine Origin, Part Origin and Program Origin in context of **07**
Turning Centre.
