Enrolment	No.	

GUJARAT TECHNOLOGICAL UNIVERSITY ME SEMESTER II EXAMINATION – SUMMER 2017

Subject Code: 2720802 Subject Name: Computer Aided Manufacturing Time:02:30 PM to 05:00 PM

Date: 25/05/2017

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) What do you mean by numerical control of a CNC technology? Draw a block diagram of a CNC machine tool. State various application of CNC machines in different fields.
 - (b) (1) Explain the concept of Machine origin and Part origin with the help of 04 suitable sketches
 - (2) State the relative merits and demerits of absolute and incremental mode of **03** part programming.
- Q.2 (a) Designate the axis of a CNC Lathe using neat sketch. State the hardware 07 differences of CNC lathes compared to conventional lathe machines.
 - (b) Justify "CNC machines have a slant bed configuration requirement". Why the slant angle more than 60 is not preferred? Mention the ways to eliminate or minimize the backlash problems in CNC machines.

OR

- (b) The worktable of a positioning system is driven by a lead screw whose pitch is 6 mm. The lead screw is connected to the output shaft of a stepper motor through a gear box whose ratio is 5:1. The stepper motor has 48 step angles. The table must move a distance of 250 mm from its present position at a linear velocity of 500 mm/min. Determine
 - (a) How many pulses are required to move the table for a specified distance
 - (b) The required motor speed and pulse rate to achieve the desired table velocity.
- Q.3 (a) Prepare a part program to machine a component shown in figure-1 on CNC 07 turning center. (Use of G71, G75, G90& G94 canned cycle is mandatory) Process Plan:

Op.	Operation	Speed	Feed	Depth	Tool
No.		rpm	(mm/rev)	(mm)	
10	Facing	1000	0.3	1	T04
20	Rough Turning	1000	0.3	2	T05
30	Finish Turning	1500	0.2	1	T06
40	Grooving	1000	0.15	1.5	T02

All Dimensions are in mm.

Raw Material Size: $\emptyset 80 \text{ mm} \times 100 \text{ mm}$



(b) State various compensations used in CNC machines. What do you mean cutter 07 radius compensation? Why is it required? Write codes used for tool length compensation using FANUC controller.

OR

Draw the relevant shapes for each program listed below. Q.3 (a)

raw the relevant shapes for	each program listed below.	
1. Incremental mode	2. Incremental mode	3. Absolute mode
X35.	X-50.	X120.
Y20.	Y-10.	Y60.
X30.	X-30.	G2 X140. Y80. R20.
Y-20.	Y10.	Y90.
X30.	X-50.	X80.
Y40.	Y-30.	X40. Y25.
X-15.	X30.	X15.
Y25	Y-20.	X0. Y0.
X15.	X70.	
Y25.	Y20.	
X-65.	X30.	
Y-40.	Y30.	
X-40.		
Y-50.		

- What is subroutine? Which are the codes used for a mirroring? Mention 07 **(b)** precautions required while working with subroutine.
- Draw a neat sketch and explain working of 5 bits absolute optical encoder used 07 0.4 (a) in CNC machines. How will you track the direction of rotations?
 - List components of DNC. Draw a switching and LAN network for a DNC. 07 **(b)**

OR

- **Q.4** Justify the role of geometry in design and manufacturing. Mention the 07 **(a)** deficiencies of geometric models.
 - Draw any two CNC network topologies. Write any three protocols used for it. 07 **(b)**
- 0.5 Specify any three generic types of feature validity checks. Explain about 07 **(a)** coverage of feature mapping.
 - What is macro? Enlist its applications. Which are the codes reserved for a macro? 07 **(b)** Explain any one macro usage with an example.

OR

- Q.5 What is feature? State types and attributes of features. Mention any seven feature 07 **(a)** properties.
 - Draw a block diagram for an automated part program generation using high end **(b)** 07 softwares like Creo/NC or Mastercam.

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