Reg. No.



Time: 3 Hours

Manipal Institute of Technology, Manipal



MAX. MARKS: 50

(A Constituent Institute of Manipal University)

II SEM. M. Tech. (MANUFACTURING ENGG. & TECH.) END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: ADVANCED CNC SYSTEMS AND AUTOMATION (MME- 534) REVISED CREDIT SYSTEM

	Instructions to Candidates:	
	 Answer ANY FIVE FULL the questions. 	
	 Missing data may be suitable assumed. 	
1A.	Explain the salient features of following types of production with sketch. i) Process Layout ii)Cellular Layout	(02)
1B.	Explain the ten strategies used for automation and production systems.	(03)
1C.	Explain the working of linear motion guide ways with balls used in CNC machine with sketch and state its advantages over the conventional slide ways.	(05)
2A.	Explain the steps followed in computer aided CNC programming.	(03)
2B.	Discuss the working of taper lock bushes used in pulleys of CNC machines with sketch.	(03)
2C.	Explain the different types of tool magazines used in CNC machining center with sketch.	(04)
3A.	Discuss the different types of work holding fixtures used in vertical and horizontal machining centers.	(03)
3B.	Discuss the different tool monitoring systems used in CNC machine.	(04)

3C. Sketch the torque and power characteristic curves of AC main spindle **(03)** motor and state its advantages over DC motor.

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- 4A. Discuss the different types of touch trigger probes used in CNC (03) machines and state their applications
 4B. Write the ISO coding system for i) Tungsten carbide turning tool holders (03) and ii) Turning inserts .
 4C. Sketch the arrangement, and write the allowable error while conducting the following geometry tests on a CNC machines.
 - i) Run out of spindle nose in turning centerii) Parallelism of spindle axis and Z axis in XZ plane in a vertical machining center
- **5A.** Explain the steps followed in estimating process capability index of a **(03)** CNC machine, using tabular column.
- **5B.** Sketch the control panel of a CNC turning center and show the different **(04)** switches and controls in it.
- **5C.** Explain the principle of working of an absolute encoder used in a CNC **(03)** machine.
- 6A. Explain the different line balancing methods used in assembly stations. (06)
- 6B. A 10 station transfer station produces a component of a pump. It is estimated that the ideal cycle time will be Tc = 1 minute. The breakdown of all types will occur with a frequency of F = 0.1 breakdown per cycle. The average downtime per line stop is 6 minutes. The scrap rate is 5 %. The casting of the component costs \$1.5 each and it will cost \$60 per hour or \$1 per minute to operate the transfer line. Cutting tool cost is \$0.15 per part. Compute the following

 Production rate
 Number of hours required to meet a demand of 1500 units per week
 Line efficiency
 Cost per unit produced.