Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

I SEMESTER M.TECH. (INDUSTRIAL AUTOMATION AND ROBOTICS)

END SEMESTER EXAMINATIONS, NOV 2017

SUBJECT: DIGITAL MANUFACTURING [MTE 5135]

(23/11/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE** questions.

1A. Consider a factory having 4 departments – Design, manufacturing, control and management. Discuss the idea of digital manufacturing taking any one aspects as the centre. **02**

1B. Consider the cases given below and suggest the type of production which is most suitable for them with their advantages. **04**
(a) A fully automated plant with dedicated production of micro-chips with zero flexibility.
(b) A factory using general purpose machines to make specific decorative items in low volume and large variety.

1C. Explain the following computer networks (a) LAN (b) WAN (c) GAN and suggest the applications of computer networks in taking manufacturing at global level. **04**

2A. Discuss the functional capabilities of each agent in autonomous assembly system? **06**

2B. How Agile Manufacturing Information System (AMIS) does provides solution towards the shortcomings of traditional manufacturing facilities? **04**

3A. Given below in figure 1 is the design modification in an anti-flair bracket assembly used in Apache Helicopter. Suggest your views how concurrent engineering plays a significant role in the design modification? **05**

Figure. 1

3B. Suggest a Concurrent process flow chart for the given Sequential flow chart in figure 3. Note - Do not add or subtract any process but feedback systems can be added or subtracted accordingly. **05**

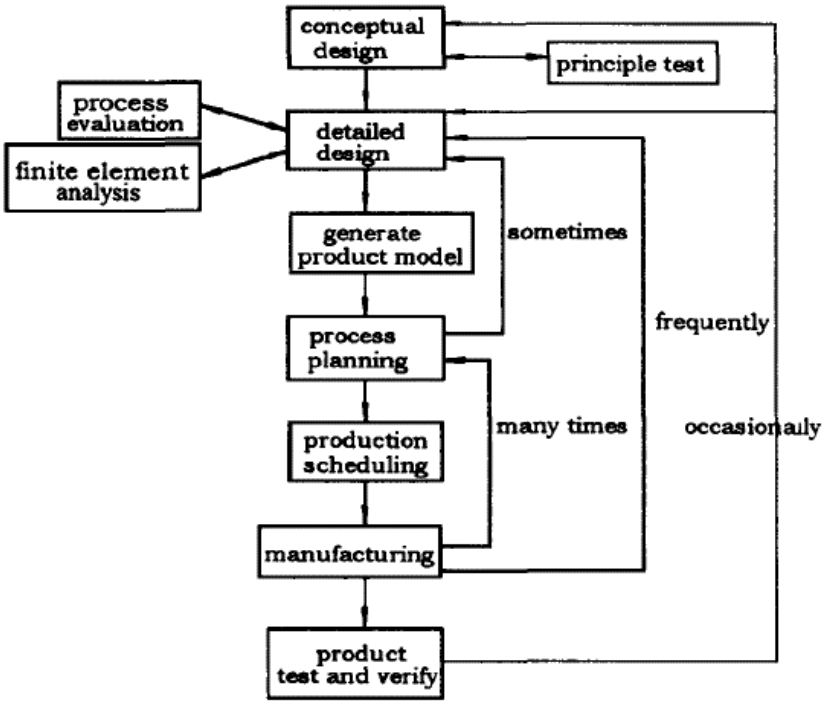

Figure 2.

4A. For packaging of MEMS device, what are the desirable functions that are supposed to be performed by packaging? **04**

4B. What are the challenges faced by MEMS industry in context of the following areas **06**
(i) Design, Simulation and Modelling.
(ii) Standardization.
(iii) Education and Training.

5A. What are the processes involved in rapid prototyping? Explain in detail. **04**

5B. What are the advantages of virtual manufacturing? Support your answer with any two manufacturing cases. **06**

6A. Determine the unit cost of output, number of unit scrap generated, and number of raw units required to produce 1000 finished units using the serial engineering approach. The unit cost of raw material = Re-10, Unit scrap cost = Re-2 and Unit processing cost = Re-7. Tolerance is set to 1+- 0.003 inches. Percentage of items below tolerance limit – 15.87 % and above the tolerance limit = 15.87 %. **06**

If by changing the machine tolerance is achieved such that only 6 % items remain below the limit and 6 % above the limit, what will be the new unit cost of output, number of unit scrap generated, and number of raw units required to produce 1000 finished units.

6B. Enumerate the electronic properties of materials used in MEMS application. What is the difference between intrinsic semiconductor and extrinsic semi-conductor? **04**