

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

# V SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

### **END SEMESTER EXAMINATIONS, NOV/DEC 2016**

## SUBJECT: MANUFACTURING TECHNOLOGY [MTE-3101]

#### REVISED CREDIT SYSTEM (24/11/2016)

Time: 3 Hours

MAX. MARKS: 50

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#### Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitable assumed.
- **1A.** What is spot facing in drilling operation?
- 1B. Discuss the principle of resistance welding? Explain the operation of resistance spot welding process with a neat sketch and also represent spot weld cycle graphically.
- **1C.** Illustrate four types of part moves in mixed model of group technology.
- **2A.** Identify the major processing parameters in shearing of sheet metal.
- 2B. Write a part program to obtain the model shown in the below (fig 2B) from the workpiece of given size. Note: For Inner Slot, scale the outer slot by factor 3
  0.35. (All dimensions are in mm)



Fig 2B: Slotting operation

With a neat sketch explain horizontal type centrifugal casting. List 5 advantages and disadvantages of centrifugal casting.

- 3A. Apply suitable surface finishing process used to remove impurities, such as stains, inorganic contaminants, rust or scale from ferrous metals and alloys after which the part is rinsed in an alkaline.
- **3B.** Distinguish the characteristics of the three categories of flexible **4** manufacturing cells and systems and flexibility criteria. Explain it graphically based on number of machines.
- 3C. Define Production flow analysis and list the steps involved in PFA. Write the advantages of route sheet data.
- 4A. With a neat sketch, give the detailed explanation of abrasive jet machining 5 process and its applications.
- **4B.** With the help of flow chart, Expalin in detail the powder metallurgy process.
- **5A.** A flexible machining system consists of a load/unloading station and two machining workstations. Station 1 is the load/unload station. Station 2 performs turning operations and consists of two servers (two identical CNC turning machines). Station 3 has one server that performs drilling (one CNC drill press). The stations are connected by a part handling system that has four work carriers. The mean transport time is 3.0 min. The FMS produces two parts A and B. The part mix fractions and process routings for the two parts are presented in the table below.(Table 5A)

The operation frequency  $f_{ijk} = 1.0$  for all operations. Determine:

- (a) Maximum production rate of the FMS,
- (b) Corresponding production rates of each product,
- (c) Utilization of each station, and
- (d) Number of busy servers at each station.

Part (j)	Part Mix (Pj)	Operat ion (k)	Descri ption	Station (i)	Process Time (tijk) min.
A	0.4	1	Load	1	4
		2	Turning	2	30
		3	Drill	3	10
		4	Unload	1	2
В	0.6	1	Load	1	4
		2	Turning	2	40
		3	Drill	3	15
		4	Unload	1	2

Table 5A: FMS

5B. With help of block diagram, discuss control loop of a contouring system which determines the velocity and position of CNC machines work table.

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