

Model Answers and Marking scheme

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE -
RAIGAD -402 103
Mid Semester Examination - October - 2017**

**Branch: M. Tech (Manufacturing Engineering Processes/Manufacturing Engg./Manufacturing
Process Engineering)** **Sem.: - I**

Subject with Subject Code: - CNC Technology (MMP102/MMF102/MPE102) **Marks: 20**

Date: - **Time: - 1 Hr.**

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Q. 1 Attempt any one of the following

**(Marks)
(08)**

a.) Explain classification of CNC systems based on various criteria.

Classification based on type of interpolator:

- A. Point to Point control
- B. Liner interpolator
- C. Contouring

Classification based on applications

- A. CNC lathes and turning centers
- B. CNC Machining Centers (Milling, drilling, etc)
- C. CNC EDM
- D. CNC grinding machines
- E. CNC cutting machines (laser, plasma, electron, or flame)
- F. CNC fabrication machines (sheet metal punch press, bending machine, or press brake)
- G. CNC welding machines
- H. CNC coordinate measuring machines

Classification based on type of feedback system

- A. Open loop
- B. Closed loop
- C. Adaptive control

Classification based on number of axes:

- A. 2 Axis
- B. 3 Axis
- C. 3½ Axis
- D. 4 Axis
- E. 4½ Axis
- F. 5 Axis
- G. 5½ Axis

H. More than 5½ Axis

Classification based on power source

- A. Pneumatics
- B. Hydraulics
- C. Electrical
- D. Hybrid

Classification based on Size and Capacity

- A. Table top machines
- B. Light duty machines
- C. Medium duty machines
- D. Heavy duty machines

Classification based on type of production

- A. Tool room machines
- B. Job shop machines
- C. Production machines

b.) Explain relative advantages and limitations of various types of drives used for CNC machines.

Criteria/Drive	Pneumatic	Electrical	Hydraulic
Power	Suitable for light loads and forces	Suitable for low to medium loads and forces	High loads and forces
Cost	Minimum	Moderate	High
Floor Space requirement	Moderate	Less	High
Accuracy	Poor	Moderate	High
Speed of operation	High (best suitable for impact loading such as stamping operation)	Moderate	Low and smooth
Disposal of working media	Not a problem	Not a problem	Difficult
Transmission of working media	Somewhat easy	Very easy	Difficult
Noise level	Very high	Moderate	Less noisy

Q. 2 Attempt any three of the following:

(12)

a.) Explain various types of interpolators used in CNC.

Type of interpolator:

- A. Point to Point control
- B. Linear interpolator
- C. Contouring

(Short explanation about all above three is expected. Sketches of each are appreciated.)

b.) Explain the construction and functioning of recirculating ball screw.

Construction and working: 2 Marks

Sketch: 1 Marks

Advantages: 1 Mark

c.) Write short note on 'Back emf type servo motor'.

Principle: 1 Mark

Construction and working: (preferably with block diagram or sketch) 2 Marks

Advantages: 1 Marks

d.) What are the typical components of a standard CNC system. Explain function of each component.

- Part Program
- Programming Device (Computer in case of CNC)
- Machine Control Unit
- Machine Tool/ process to be controlled
 - Drive system
 - Guide ways and sideways
 - Feedback system
 - Work and tool holding devices

(Short explanation about the working of each above component is expected)

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