

Scheme – I

Sample Question Paper

Program Name : Diploma in Mechanical Engineering
Program Code : ME
Semester : Fifth
Course Title : Advanced Manufacturing Processes
Marks : 70

22563

Time: 3Hrs.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following.

10 Marks

- a) Enlist the different type non conventional machining processes.
- b) Name the various types milling machines.
- c) List various gear finishing methods.
- d) State advantages and limitations of CNC machine.
- e) Define the 'Work Zero position' and 'Machine Zero position' of CNC machine.
- f) Write meaning of following M-codes.
 - i) M03 and ii) M05
- g) Give one example of fixed automation and one example of flexible automation.

Q.2) Attempt any THREE of the following.

12 Marks

- a) Explain the functions of the dielectric fluid used in EDM.
- b) Compare between up milling and down milling process.
- c) Describe the concept of 'Tool Offset' for CNC machine with suitable example.
- d) Justify need of cutter radius compensation given for CNC milling programming.

Q.3) Attempt any THREE of the following.

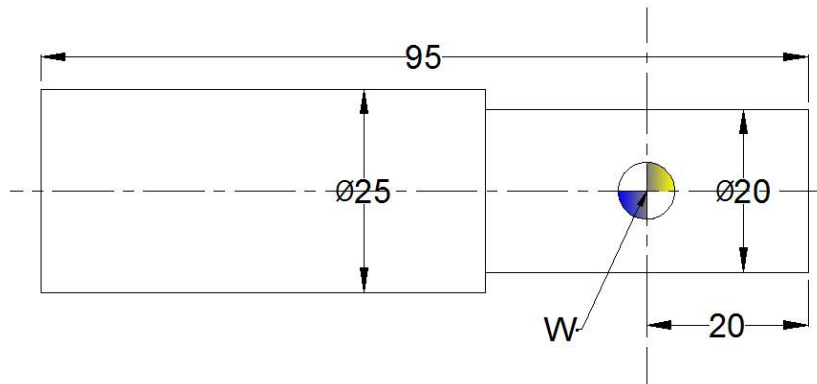
12 Marks

- a) Distinguish between gear shaping by pinion cutter and gear shaping by rack cutter.
- b) Compare lead screw of conventional machine and re-circulating ball screw of CNC machine.
- c) Differentiate between canned cycle and subroutine function for CNC machine.
- d) Draw the diagram of simple robot and show different components of it.

Q.4) Attempt any THREE of the following.

12 Marks

- Classify the different methods of gear manufacturing.
- Differentiate between automatic tool changer (ATC) and automatic pallet changer (APC) of CNC machine.
- Prepare process sheet and calculate cutting parameter for the following component with neat diagram. All dimensions are in mm. Given: Raw material stock size- $\text{Ø}25 \times 96$ length. Stock Material- Aluminum. Feed (f) =0.2 mm/rev. Cutting velocity (V) =90 m/min. Work Zero(W)



- Develop full G and M code manual part program of CNC lathe for above component in word address format (WAF).
- Justify the use of FMS in today's manufacturing situation.

Q.5) Attempt any TWO of the following.

12 Marks

- Draw set up diagram of wire cut EDM processes showing all the elements. State the functions of each element.
- Calculate cutter RPM to cut 'T' slot when cutting speed (V) = 90 m/min. Diameter of cutter $\text{Ø} = 10$ mm. and show work and cutter arrangement diagram for above operation.
- Apply right hand rule of axes identification for CNC lathe and CNC milling machine.

Q.6) Attempt any TWO of the following.

12 Marks

- Draw set up diagram and demonstrates the range of following process control parameters of abrasive jet machining process.
 - Grain types and size.
 - Gas type and pressure.
 - Nozzle material and hardness.
- Apply compound indexing method for indexing 69 divisions.
- Draw experimental set up of gear manufacturing by horizontal milling machine and show various elements on it with its function.

Scheme – I

Sample Test Paper - I

Program Name : Diploma in Mechanical Engineering
Program Code : ME
Semester : Fifth
Course Title : Advanced Manufacturing Processes
Marks : 20

22563

Time: 1 Hour

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

08 Marks

- a) State any four characteristics of dielectric fluid used in EDM process.
- b) Write any two functions of electrolyte used in Electro Chemical Machining (ECM)
- c) List various type of cutters used in milling machining process.
- d) Name the various methods of indexing.
- e) Enlist the different type of gears.
- f) State the principle of gear honing process.

Q.2 Attempt any THREE.

12 Marks

- a) Differentiate between abrasive jet machining (AJM) and Ultrasonic machining (USM)
- b) Draw diagram of Wire Cut Electric Discharge Machining (WEDM) and show all elements on it.
- c) Explain the straddle milling operation with neat sketch.
- d) Apply compound indexing method to index 51 divisions on blank.
- e) Describe gear shaping by pinion method with suitable diagram.
- f) Justify, selection of gear material depends on amount of power transmitted.

Scheme – I

Sample Test Paper - II

Program Name : Diploma in Mechanical Engineering
Program Code : ME
Semester : Fifth
Course Title : Advanced Manufacturing Processes
Marks : 20

22563

Time: 1 Hour

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

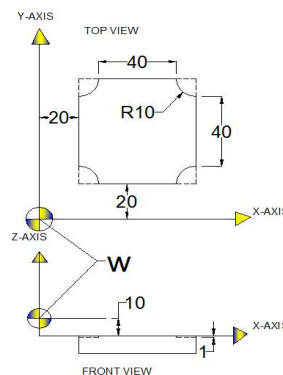
08 Marks

- a) Write any two feedback devices used in closed loop control CNC machine.
- b) State the thumb rule for axis identification for CNC machine.
- c) Write the meaning G00 and G01 code used in CNC programming.
- d) List various compensations required during CNC programming.
- e) Name the various types of automations in industry.
- f) Define- Automation

Q.2 Attempt any THREE.

12 Marks

- a) Explain, closed loop control system CNC machine with neat sketch.
- b) Apply right hand rule to identify axes of wire cut EDM CNC machine.
- c) Prepare process sheet and calculate cutting parameter for the following component with neat diagram. Use HSS end milling cutter of $\text{Ø}20\text{mm}$. Raw material – Aluminium Raw material size= 60 X 60 Feed rate=0.2 mm/rev. Cutting speed= 90 m/min.



- d) Develop full G & M code CNC manual part programme of CNC milling for above component. Use cutter radius compensation off.
- e) Explain various elements of Flexible Manufacturing System.
- f) Draw sketch of robot and show various parts on it.

22563

11920

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Answer each next main Question on a new page.
- (3) Illustrate your answers with neat sketches wherever necessary.
- (4) Figures to the right indicate full marks.
- (5) Assume suitable data, if necessary.
- (6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

- 1. Attempt any FIVE of the following:** **10**
- a) Enlist any four process parameters in EDM.
- b) State the equation of cutting speed for milling operation.
- c) List the various gear finishing methods.
- d) Name the basic components of an CNC machine.
- e) Write only classification of CNC machine.
- f) Write meaning of following G and M-codes.
- (i) G02
- (ii) M30
- g) State any two examples of fixed automation.

P.T.O.

2. Attempt any THREE of the following: 12

- a) Explain the purpose of electrolyte in ECM.
- b) Compare between vertical and horizontal milling machine.
- c) Describe automatic tool changer (ATC) of CNC machine.
- d) Justify need of tool length compensation of CNC machine.

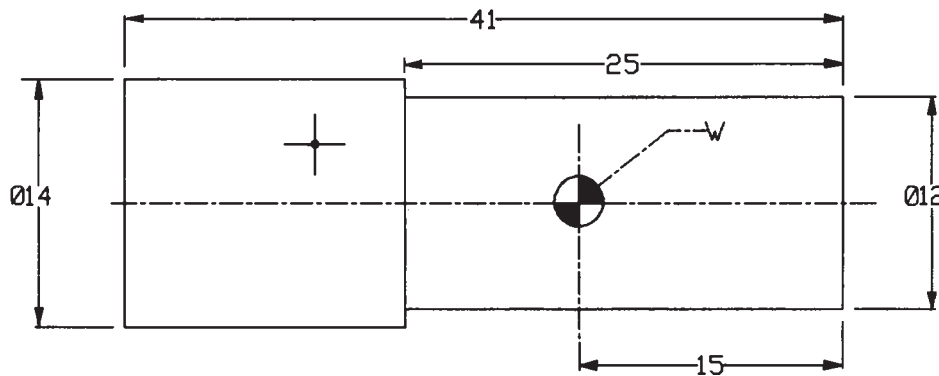
3. Attempt any THREE of the following: 12

- a) Differentiate between gear hobbing and gear honing.
- b) Compare “Point to Point” and continuous path CNC machine.
- c) Explain the meaning of following block format of CNC.
N020 G03 X12 Y14 Z-0.5 I0 J12 F90 E0B
- d) Describe fixed and programmable automation.

4. Attempt any THREE of the following: 12

- a) Classify the different methods of gear manufacturing.
- b) Apply right hand rule of axes identification to CNC vertical milling with neat diagram.
- c) Calculate the cutting parameters and prepare process sheet for the component shown in Fig. No.1. with neat diagram. All dimensions are in mm.

Given: Raw material - Aluminium, stock size $\phi 14 \times 42$
length, feed (f) = 0.2 mm/rev, cutting speed (V) = 90 m/min.
Consider work zero (W) as per the Fig. No.1.



Q. No. 4c & 4d Fig. No. 1

- d) Develop full G and M code manual part program of CNC lathe for component shown in Fig. No.1. using word address format (WAF).
- e) Justify the need of Group Technology in today's manufacturing situation.

5. Attempt any TWO of the following: 12

- a) Draw set-up diagram of ECM processes showing all the elements. State the function of each elements.
- b) Draw internal mechanism of universal dividing head and label the parts.
- c) Explain need of virtual CNC machine simulators.

6. Attempt any TWO of the following: 12

- a) Draw set-up diagram of wire cut EDM and label the parts, also suggest approximate range of following process parameters with it's measuring unit.
 - (i) Discharge current **OR** Pulse frequency.
 - (ii) Wire speed **OR** Wire tension.
 - b) Apply compound indexing method to divide 51 divisions on circular blank.
 - c) Use the different milling cutter to cut 'T' slot on rectangular block with neat diagram, also mention the sequence of operations and types of milling cutter used.
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22563

12223

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (7) Preferably write answers in sequential order.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Write advantages of EDM process. (Any two)
 - b) State different types of milling machines.
 - c) Enlist any two gear manufacturing methods.
 - d) State the functions of any two important elements of CNC machine.
 - e) State the meaning of Code M03 and M06 in CNC part programming.
 - f) Define home position and programme zero in CNC part programming.
 - g) Define Automation. Give any one example of hard automation.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain with the neat sketch working principle of Abrasive Jet Machining.
 - b) Draw the neat sketch of Column and Knee type of milling machine. State the function of each part of the machine.
 - c) Describe the concept of cutter radius compensation for CNC machine with suitable example.
 - d) Justify the need of virtual simulation of CNC machine.
- 3. Attempt any THREE of the following:** **12**
- a) Explain with the neat sketch any one type of gear hobbing process.
 - b) Compare CNC (Computerized Numerical Control) machine with DNC (Direct Numerical Control) machine.
 - c) Explain the term preparatory function and miscellaneous function in the context of CNC part programming.
 - d) "Pneumatic actuators are widely used in Robotics." Justify.
- 4. Attempt any THREE of the following:** **12**
- a) Compare gear hobbing process with gear shaping process (Atleast four points)
 - b) Explain working and importance of re-circulating ball screw used in CNC machine.
 - c) Prepare process sheet and calculate cutting parameters for the component shown in Figure 1. All dimensions are in mm.
Given: Raw material stock size - ϕ 60 x 120 length.
Stock material - Aluminium
Feed $f = 0.2$ mm / rev.
Cutting velocity (V_c) = 90 m / min.
Assume suitable data if required.

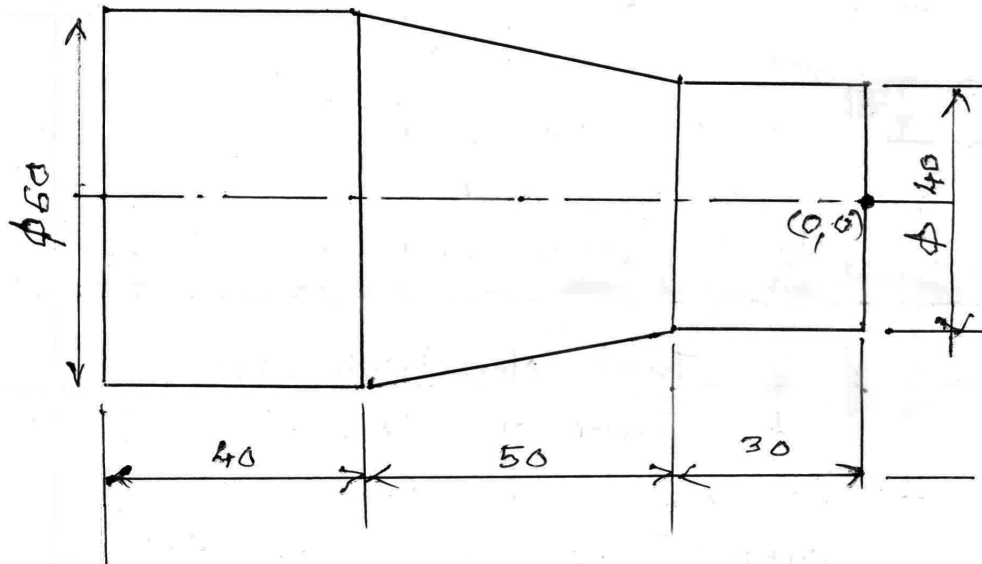


Fig. No. 1

- d) Develop full G and M code manual part program of CNC lathe for component given in Figure 1 in word address format (WAF).
- e) Justify use of cellular manufacturing in today's manufacturing situation.

5. Attempt any TWO of the following:

12

- a) Draw set up diagram of Ultrasonic Machining (USM) process, showing all the elements. State the function of each element.
- b) A milling cutter of diameter $\phi = 10$ mm and rotating at 1000 rpm is used to cut 'L' shape slot. Find cutting velocity in m/min. Show cutter and work piece relative arrangement with neat sketch.
- c) Describe Axes nomenclature for CNC turning centre and CNC milling centre.

6. Attempt any TWO of the following:

- a) Draw setup diagram and give details of following process control parameters of Electro Discharge Machining (EDM).
- i. Discharge current range.
 - ii. Voltage range
 - iii. Type of dielectric
 - iv. Type of electrode material
- b) Apply simple (plain) indexing method for indexing 30 divisions use number of holes on plate 1, or plate 2 or plate 3 as given below. Reduction ratio of worm gear is 40:1.
- Plate 1 → 15, 16, 17, 18, 19, 20
Plate 2 → 21, 23, 27, 29, 31, 33
Plate 3 → 37, 39, 41, 43, 47, 49
- c) Justify the need of gear finishing. Demonstrate any one gear finishing process with important process parameters.
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22563

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Preferably, write the answers in sequential order.
- (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Enlist the different types of non-conventional machining processes.
- b) Name the various types of cutters used in milling operations.
- c) Enlist the different types of gear manufacturing methods.
- d) State the advantages of CNC machines over conventional machines.
- e) State the meaning of subroutine and canned cycles in CNC part programming.
- f) State the function of Automatic tool changer (ATC) in CNC machines.
- g) Define Robotics. State the components of Robotics manipulator.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain working principle of Electro Discharge Machining (EDM) with sketch.
 - b) Explain Face milling and side milling operations with neat sketch.
 - c) Explain the concept of tool presetting in CNC tooling.
 - d) Explain the use of following codes in CNC part programme.
 - (i) G00
 - (ii) G03
 - (iii) M03
 - (iv) M30
- 3. Attempt any THREE of the following:** **12**
- a) Explain the working principle of gear hobbing with suitable sketch.
 - b) Explain absolute and incremental co-ordinate system in CNC machines with simple suitable example.
 - c) Explain the Do loops programming format with simple example.
 - d) Compare hard automation and soft automation stating one application of each.
- 4. Attempt any THREE of the following:** **12**
- a) Classify gear finishing methods stating one application of each.
 - b) Explain Re-circulating ball screw arrangement in CNC machines with neat sketch.

- c) Develop a part program for turning on CNC lathe for the component shown in Fig. 1 using ISO format. Use the tool path co-ordinates shown in Fig. 1. Neglect tool compensation. Assume suitable data if necessary. Speed of spindle 1000 rpm and feed 100 mm/min.

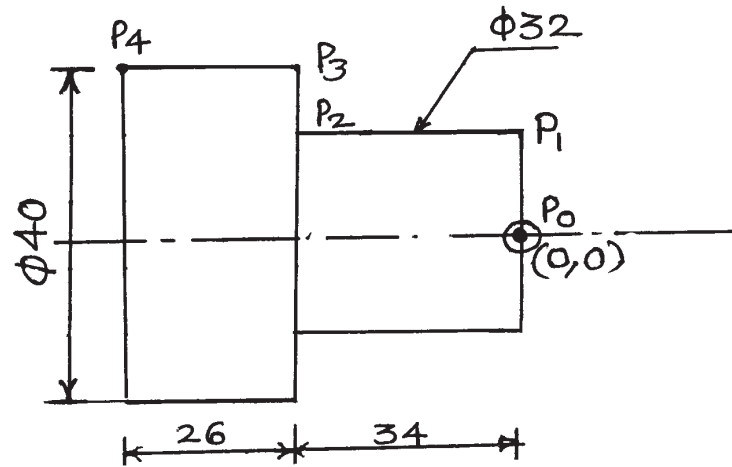


Fig. No. 1

- d) Develop a part program for CNC milling for the part shown in Fig. 2 using ISO format. Take spindle speed 800 rpm, feed 80 mm/min. Depth of slot 5 mm. Assume suitable data if necessary. Neglect cutter compensation.

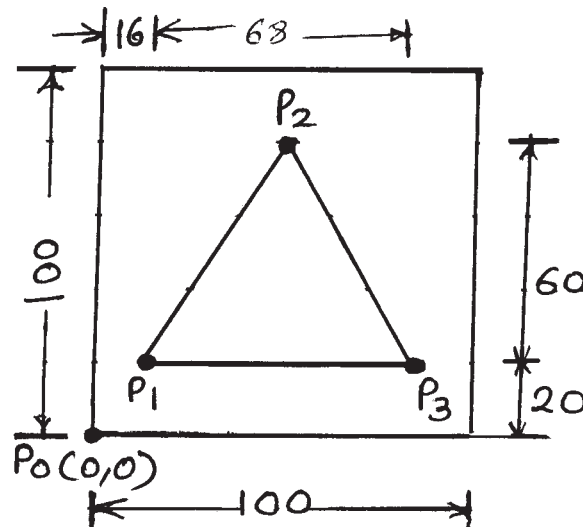


Fig. No. 2

- e) Select an engineering product manufactured by applying group technology principles. Write its part classification and coding.

5. Attempt any TWO of the following:**12**

- a) Draw Abrasive Jet Machining (AJM) setup diagram showing all the elements. State the function of each elements.
- b) Find cutting speed for milling operation to machine two parallel vertical surfaces of a workpiece simultaneously by using pair of side milling cutters, when cutter rpm is 600 rpm and diameter of cutter is 200 mm.
Draw the cutter and work arrangement diagram for above operation.
- c) Sketch the Axes nomenclature for CNC lathe and CNC milling. Show major axes with sign conventions.

6. Attempt any TWO of the following:**12**

- a) Draw the setup diagram of ultrasonic machining (USM). Explain the function of elements in setup. State the process parameters in it.
 - b) Compare simple indexing and compound indexing methods with suitable example.
 - c) Draw the setup of Gear shaping by pinion cutter or rotary gear cutter and explain its working.
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