

September 2021

**MANUFACTURING PROCESS-II***Time Allowed: 1.5 Hours**Full Marks: 70***Answer to Question No.1 is compulsory and Answer any two questions from the rest.**

1. Choose the correct answer from the given alternative (any twenty): [2×20]
- i. Stroke of a shaping machine is 250 mm. It makes 30 double strokes per minute. Overall average speed of operation is-
    - a. 3.75 m/min
    - b. 5.0 m/min
    - c. 7.5 m/min
    - d. 15 m/min
  - ii. Quality threads can be produced by-
    - a. thread milling
    - b. thread chasing
    - c. thread chasing with single point tool
    - d. thread casting
  - iii. The diameters of the work surface before and after machining were 100 mm and 80 mm respectively. The depth of cut was-
    - a. 40 mm
    - b. 30 mm
    - c. 20 mm
    - d. 10 mm
  - iv. In small lot production for machining T- slots on machine tables, it is expected to use-
    - a. Shaping machine
    - b. Broaching machine
    - c. Vertical milling machine
    - d. Horizontal milling machine
  - v. For cutting double start screw threads of pitch 1.0 mm on a lathe, the tread cutting tool should have a feed rate of-
    - a. 0.5 mm/rev
    - b. 1.0 mm/rev
    - c. 2.0 mm/rev
    - d. 4.0 mm/rev
  - vi. Deep hole drilling of small diameter is done with EDM by selecting the tool material as-
    - a. copper wire
    - b. tungsten wire
    - c. brass wire
    - d. tungsten carbide
  - vii. The standard specification of a grinding wheel is A-46-M-6-V-21. It means a wheel of-
    - a. aluminium oxide of mesh size 6
    - b. boron carbide of mesh size 46
    - c. aluminium oxide of mesh size 46
    - d. silicon carbide of mesh size 6
  - viii. A lead screw with half nuts in lathe, free to rotate in both directions has-
    - a. V-threads
    - b. Whitworth threads
    - c. Buttress threads
    - d. ACME threads
  - ix. Strong screw threads are produced by-
    - a. thread milling
    - b. thread chasing
    - c. thread cutting in single point tool
    - d. thread rolling
  - x. Cutting speed in grinding is set to a high value to-
    - a. reduce the cutting time
    - b. increase the bond strength
    - c. improve cooling job and wheel
    - d. reduce wheel wear
  - xi. The flanks of teeth of rack type gear cutter used for cutting involute gear profiles are-
    - a. cycloidal
    - b. circular
    - c. involute
    - d. straight
  - xii. Tool life in case of grinding wheel is the time-
    - a. between two successive regrinds of wheel
    - b. taken for the wheel to be balanced
    - c. taken between two successive wheel dressing
    - d. taken for a wear of 1 mm on its diameter
  - xiii. The teeth of both external and internal spur gear can be cut of-
    - a. milling machine
    - b. gear shaping machine
    - c. gear hobbing machine
    - d. all of these
  - xiv. In a shaper machine, the mechanism for tool feed is-
    - a. Geneva mechanism
    - b. Whitworth mechanism

- c. Ratchet and Pawl mechanism  
d. Ward-Leonard system
- xv. In Whitworth quick return mechanism (used in shapers) the velocity of the ram is maximum at-  
a. middle of the forward stroke  
b. beginning of return stroke  
c. end of return stroke  
d. middle of the return stroke
- xvi. Minimum dimensional and form accuracy can be obtained in the cylinder bores of automobile engines if the bores are finished by-  
a. lapping  
b. reaming  
c. internal grinding  
d. honing
- xvii. Abrasives are not used in-  
a. buffing  
b. burnishing  
c. polishing  
d. superfinishing
- xviii. The final finishing process for the surface plate made of CI which is used as reference surface is-  
a. buffing  
b. grinding  
c. hand scraping  
d. honing
- xix. Internal gear cutting operation can be performed by-  
a. milling  
b. shaping with rake cutter  
c. shaping with pinion cutter  
d. hobbing
- xx. In a shaping process the number of double strokes per minute is 30 and the quick return ratio is 0.6. If the length of the stroke is 250 mm, the average cutting velocity in mm/min is-  
a. 3.0  
b. 4.5  
c. 7.5  
d. 12.0
- xxi. Thread chasing required in cutting screw threads because-  
a. it improves surface finish  
b. it is necessary to follow the thread  
c. it increases the threading tool life  
d. it reduces the cutting forces
- xxii. More than one tool head can be used in which of the following machine tools?  
a. Slotter  
b. Shaper  
c. Planer  
d. Milling machine
- xxiii. The machine tool that has the cutting stroke (removes material) when the ram moves towards the body is-  
a. Universal shaper  
b. Draw cut Shaper  
c. Mechanical shaper  
d. Vertical shaper
- xxiv. An end mill having 4 teeth is rotating at 250 rpm. If the feed per tooth is given as 0.1 mm, what is the table feed in mm/min?  
a. 100 mm/min  
b. 10 mm/min  
c. 250 mm/min  
d. 25 mm/min
- xxv. Which of the following material is not made by injection molding?  
a. nuts  
b. tubes  
c. car handles  
d. electrical fittings
2. a. How does tumbler gear reversing mechanism function in a centre lathe?  
b. Describe the method of generation of a long and small taper in a centre lathe.  
c. Find the setting required for turning a taper of 85 mm diameter to 75 mm diameter over a length of 200 mm, while the total length of the job is 300 mm between centres. Tailstock off-set is to be used for generating the prescribed taper. [6+5+4]
3. a. Describe the thread cutting mechanism step by step and mention the mode of movement and tool and carriage.  
b. The lead screw of a lathe has 4 TPI. Calculate the change gears for cutting 12 RH threads per inch on a job.  
c. Estimate the actual machining time required for the component (C40 steel) of 42 mm diameter and 120 mm length. The available spindle speeds are, 70, 110, 176, 280, 440, 700, 1100, 1760 and 2800. Use a roughing speed of 30 m/min and finish speed of 60 m/min. The feed for roughing is 0.24 mm/ rev while that for finishing is 0.10 mm/rev. The maximum depth of cut for roughing is 2 mm. Finish allowance may be taken as 0.75 mm. Blank to be used for machining is 50 mm in diameter. [7+3+5]
4. a. Describe the operation of the quick return motion in a mechanical shaper.

- b. In machining a job on a shaper ram makes 40 strokes per min and the length of stroke is 200 mm. Calculate the cutting speed.
- c. A mild steel plate 400 mm×800 mm×30 mm is to be shaped along its wider face. The ratio of return time to cutting time is 2:3 and the feed per cycle is 2 mm. Tool approach and over-travel respectively are 50 mm each. Select a suitable cutting speed from **Table 1.** and calculate the machining time required for machining the given plate with HSS tools.

**Table 1. Average cutting speeds and feeds**

Material to be machined	High Carbon steel tools		HSS tools		Carbon tipped tools		
	Speed (mpm)	Feed (mm)	Speed (mpm)	Feed (mm)	Speed (mpm)	Feed (mm)	Depth of cuts (mm)
Cast Iron	9	1.5	18	2	30	0.13-0.5	0.8-12.7
Mild Steel	12	1.25	24	1.5	-	-	-
Carbon Steel	7.5	1	15	1.25	-	-	-
Brass	30	1.25	48	1.25	60	0.25-0.4	0.8-11
Cast Steel	-	-	-	-	45	0.13-0.25	0.8-6.4

[7+2+6]

5. a. How does feed mechanism work in a drilling machine?  
 b. What is deep hole drilling?  
 c. A hole of 40 mm diameter and 50 mm deep is to be drilled in mild steel component. The cutting speed can be taken as 65 m/min and the feed rate as 0.25 mm/rev. Calculate the machining time. [6+4+5]
6. a. Illustrate power feed mechanism in a column & knee type milling machine.  
 b. Explain the gang milling operation with neat sketch.  
 c. A C50 steel flat surface of 100 mm × 250 mm is to be produced on a horizontal axis milling machine. A HSS slab mill of 100 mm diameter and 150 mm width is to be used for the purpose. The milling cutter has 8 teeth. Calculate the machining time assuming that entire stock can be removed in one depth of 2 mm. Take cutting speed and feed rate as 20 m/min and 0.13 mm/tooth respectively. [7+3+5]
7. a. Calculate the indexing requirement for 127 divisions on a milling machine equipped with a differential indexing head. The index plates available are  
 Plate no. 1: 15, 16, 17, 18, 19, 20 holes  
 Plate no. 2: 21, 23, 27, 29, 31, 33 holes  
 Plate no. 3: 37, 39, 41, 43, 47, 49 holes  
 The change gear set available is 20, 24, 28, 32, 40, 44, 48, 56, 64, 72, 86, 100.  
 b. Discuss briefly on gear hobbing operation. [8+7]
8. a. How is the abrasive selected for a grinding operation?  
 b. What are the grinding process parameters that are of interest?  
 c. What are the various types of surface grinding approaches that are possible?  
 d. Describe about the dressing and balancing requirement in grinding. [3+3+3+6]
9. a. Specify the honing parameters to be considered for good honing practice.  
 b. Write short note on  
 i. vacuum forming,  
 ii. rotational moulding [3+6×2]