Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2152007 **Date:24/11/2016**

Subject Name:Manufacturing Technology - I

Time:10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary and clearly mention the same.**
3. **Figures to the right indicate full marks.**
4. **Draw neat diagrams. Diagrams with inferior quality may not be awarded credit.**

MARKS

Q.1 **Choose the most appropriate option to fill in the following blanks.** **14**

1 _____ is used for cutting force measurement during machining operation. (dynamometer, roughness tester, mandrel, lead screw)

2 Discontinuous chips during machining operation are produced by _____ workpiece material. (ductile, brittle, soft, malleable)

3 In orthogonal machining the cutting edge of the tool is _____ to cutting velocity. (inclined, parallel, not perpendicular, perpendicular)

4 Automatic feed during thread cutting operation is provided by _____. (feed rod, tail stock, live center, lead screw)

5 _____ mechanism is responsible for not performing machining during return stroke on shaper machine. (clapper box, quick return, pawl and ratchet, auto feed)

6 Linear motion which is perpendicular to the spindle axis on lathe machine is provided by _____. (head stock, tail stock, cross slide, bearings)

7 Back gears in head stock are used to _____ of workpiece. (increase RPM, reduce RPM, maintain constant RPM, reverse rotation)

8 For machining long and small taper on lathe machine _____ is used. (tail stock off set method, compound rest swivel method, form cutter, taper grinding wheel)

9 Cutting tool has _____ motion on shaper machine. (rotary, reciprocating, swinging, harmonic)

10 Lead screw rotations are reversed using _____ arrangement. (feed rod, tumbler gear, back gear, bull gear)

11 _____ drilling machine is used for drilling operation on heavy and large workpieces. (bench, portable, pillar, radial)

12 Cutters are mounted on _____ during milling operations. (arbor, column, knee, table)

13 _____ material is not used as abrasive particle material of grinding wheel. (silicon carbide, aluminum oxide, resin, diamond)

14 Enlargement of a hole diameter along full length for correcting the axis of existing hole is called as _____ operation. (drilling, reaming, boring, counter boring)

Q.2 **(a)** Describe the different functions performed by cutting fluids during machining operations. **03**

(b) List out different specifications of lathe machine and describe them in brief. **04**

Draw neat diagrams wherever necessary to support your answer.

(c) Give complete detail to carry out following alignment tests: **07**

1. Line joining two centers parallel with lathe bed
2. Parallelism between longitudinal table movement and spindle axis on horizontal milling machine

OR

(c) Draw neat schematic labeled diagrams of the following machining processes and briefly illustrate the relative motions and tooling needed for performing that operation. **07**

1. Knurling operation on lathe machine
2. Parting off operation on lathe machine

Q.3 **(a)** With the help of neat schematic diagrams explain the setting of stroke length and position of stroke length on shaper machine. **03**

(b) Differentiate up milling and down milling process from various aspects. Also discuss with critical reasons and neat schematic diagrams that up milling is safer than down milling. **04**

(c) Explain with suitable diagrams the machine set up, tooling required and relative motions between tool and workpiece for machining horizontal flat surface, vertical flat surface and inclined flat surface on shaper machine. **07**

OR

Q.3 **(a)** With the help of neat schematic diagrams briefly describe the following milling machine operations. Also mention the tooling required and machine set up for all operations. **03**
string milling; abreast milling; profile milling

(b) Differentiate between the quick return mechanisms of shaper machine and planar machine. **04**

(c) Describe with the help of neat schematic diagrams the effect on the values of rake angle and clearance angle when the single point cutting tool is positioned off-center (with tool axis horizontal) either above or below the axis of workpiece rotation on lathe machine. How should the tool be positioned, if the tool is required to be located off-center? **07**

Q.4 **(a)** Give brief classification of types of drilling machines available for different applications. **03**

(b) Differentiate between the constructional features of center type cylindrical grinding machine and surface grinding machine. Support your answer with the help of schematic diagrams of both grinding machines. **04**

(c) Determine the suitable gear trains for cutting the following threads on work pieces using a lathe machine equipped with 6 TPI lead screw. The available gears are 20 to 120 teeth in steps of 5 teeth and one additional gear with 127 teeth. Also draw the neat schematic diagrams of the end gear train in both cases to show the relative motions amongst work piece, gears, lead screw and cutting tool. **07**

Pitches to be cut on workpiece are mentioned as follow.

1. 2 mm, single start, left hand thread
2. 1.25 mm, single start, left hand thread

OR

Q.4	**(a)**	Differentiate between lapping and honing machining processes.	**03**
	(b)	What is called deep-hole drilling? What are the difficulties associated with deep-hole drilling? Explain the different ways to overcome these difficulties of deep-hole drilling.	**04**
	(c)	Determine the required machine set up to cut 40 teeth helical gear with right hand helical teeth on a universal milling machine with 6 mm pitch table screw. The diameter of the gear blank is 100 mm and the lead of the helix is 400 mm with a tooth depth of 10 mm. The milling machine is supplied with a standard dividing head and a change gear set 20 to 120 teeth in steps of 4 teeth. Your tasks: 1. Determine the driver to driven gear train and draw machine set up for above mentioned helical milling operation with all relative motions. 2. Determine the helix angle to be cut and direction of table swivel for it. 3. Determine the indexing. Assume that the Brown and Sharpe type indexing plates are available.	**07**
Q.5	**(a)**	Explain that hard grinding wheels are used for soft workpiece material and soft grinding wheels are used for hard workpiece material.	**03**
	(b)	Differentiate between Dressing and Truing of grinding wheel.	**04**
	(c)	Explain in brief various ways of machining to produce internal and external key ways on cylindrical workpiece of short length and long length. Support your answer with neat schematic diagrams and critical reasoning.	**07**

OR

Q.5	**(a)**	Differentiate amongst boring, counter boring and counter sinking operations carried out on drilling machine.	**03**
	(b)	Briefly discuss about working principle of through feed center less grinding and plunge cut center less grinding.	**04**
	(c)	Describe the sequence of machining operations to be carried to manufacture a V-block on shaper machine from cube shaped raw material. Support your answer with the help of neat schematic diagrams in a tabular format showing the sequence on machining operations and tooling required for each machining operation. Assume suitable data and clearly mention the same.	**07**

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