Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER • 2015

Subject Code: 152002 **Date: 05/05/2015**

Subject Name: Manufacturing Technology I

Time: 02.30pm-05.00pm **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.**

Q.1 **(a)** 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**

(b) Draw schematic diagrams of following types of chips. Also explain the factors and machining parameters responsible to produce following types of chips. **07**

1. Continuous chips
2. Discontinuous chips
3. Continuous chips with built-up edge

Q.2 **(a)** Draw and briefly describe the complete set-ups with all tooling to produce taper on short length workpiece and long length workpiece separately. Bring out the difference between these two set-ups. **07**

(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. **07**

OR

(b) Briefly describe the following machining operations to be carried out on vertical drilling machine with the help of schematic diagrams and brief descriptions. **07**

1. drilling
2. boring
3. counter boring
4. counter sinking
5. reaming
6. trepanning
7. spot facing

Q.3 **(a)** Explain the following with the help of neat schematic diagrams. **07**

1. Straddle milling operation
2. String milling operation

(b) Design GO and NOTGO gauges for the following. Produce necessary **07**

schematic diagrams to bring out the nominal sizes of respective gauges.

1. GO and NOTGO plug gauges for the hole of $\Phi\ 30^{\pm 0.2}$ mm diameter
2. GO and NOTGO ring gauges for the shaft of $\Phi\ 35^{\pm 0.3}$ mm diameter

Assume all tolerances as 5% of workpiece tolerance.

OR

Q.3 (a) Manufacture the component shown in figure1 on capstan and turret lathe from the bar stock of 77 mm in diameter, supported and fed by bar feed mechanism. Produce in a tabular format the most appropriate sequence of machining operations along with the necessary tooling needed to manufacture the component shown in figure1from given raw material on capstan and turret lathe. Also show the schematic diagram of the turret and other tool posts with all tooling loaded into it along with the workpiece in position. **07**

(b) Compare and contrast between up-milling and down-milling operation with suitable diagrams. Bring out minimum five significant differences along with necessary diagrams for this comparison. **07**

Q.4 (a) For cutting the following single start threads on engine lathe, clearly mention at which position of the chasing dial the split nut must be engaged to follow the same thread in each successive tool passes of different depth of cuts. **07**

1. Cut 8 mm pitch single start thread on workpiece with 3 mm pitch lead screw, 40 teeth pinion and 8 division chasing dial.
2. Cut 2.25 mm pitch single start thread on workpiece with 6 mm pitch lead screw, 15 teeth pinion and 3 division chasing dial.
3. Cut 2 mm pitch single start thread on workpiece with 6 mm pitch lead screw, 40 teeth pinion and 3 division chasing dial.

(b) Explain how the following are varied and adjusted. Draw necessary sketches to support your answer. **07**

1. Stroke length on shaper machine
2. Position of stroke length on shaper machine

OR

Q.4 (a) Determine the required machine set up to cut 8 teeth slab milling cutter with left hand helical teeth on a universal milling machine with 6 mm pitch table screw. The diameter of the cutter required is 85 mm and the lead of the helix is 500 mm with a tooth depth of 5 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. **07**

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.

(b) Bring out the relative merits and demerits between hydraulic mechanism and **07**

mechanical mechanism for producing reciprocating motion on shaper machine. Draw neat schematic diagram of hydraulic mechanism to produce reciprocating motion.

Q.5 (a) Evaluate the following statements: **07**

1. Longitudinal feedrate of a grinding wheel against the length of workpiece surface determines the geometrical shape of grinding wheel after its wear.
2. Hard grinding wheels are used for soft workpiece and soft grinding wheels are used for hard workpiece.

(b) Draw and explain the following alignment tests: **07**

1. Over arm bore is concentric with the bore of spindle on horizontal milling machine
2. Movement of quill is parallel to the bed of lathe machine

OR

Q.5 (a) With the help of schematic diagram, explain the working of center less grinding process. Bring out relative motions amongst grinding wheel, workpiece and regulating wheel. **07**

(b) Explain in brief various machining ways available 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**

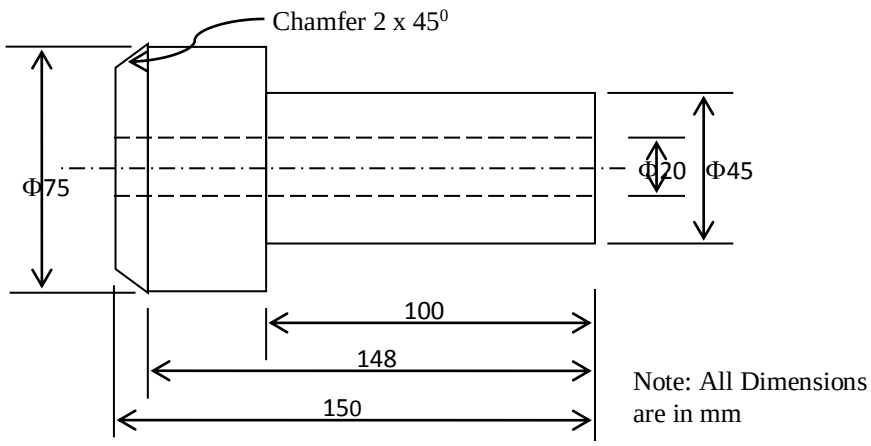

Figure1. Component to be machined on Capstan and Turret Lathe

****