

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-Vth Examination December 2010****Subject code: 152002****Subject Name: Manufacturing Technology –I****Date: 15 /12 /2010****Time: 03.00 pm - 05.30 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1**
- (a) Give differences between Capstan lathe and Turret lathe. **05**
 - (b) Explain different taper turning methods. **05**
 - (c) Determine the change gear to be fitted in the end gear train of a lathe without feed box to cut the following threads : (1) 8 TPI (2) 9 TPI (3) 2.5 mm pitch (4) 2.75 mm pitch. The lathe has a lead screw with 6 TPI and a change gear set with 20 to 120 teeth in steps of 5 teeth and an additional 127 teeth gear. **04**

- Q.2**
- (a) (i) Explain with sketch single point cutting tool geometry. **04**
(ii) List the properties of cutting fluids. **03**
 - (b) (i) Explain the radial drilling machine with neat sketch. **03**
(ii) A 15 mm diameter hole is to be drilled in a 25 mm thick mild steel plate at a speed of 0.55 m/s and feed rate of 0.1 mm per revolutions. The point angle of the drill is 118° and approach and over travel may be assumed to be 6 mm. Calculate : **04**
 - (i) Time required for the cut
 - (ii) Drill thrust and torque
 - (iii) Power required if the efficiency of transmission is 80%

OR

- (b) (i) Explain any two boring machines with neat sketch. **05**
(ii) Deep hole drilling is preferred on lathe than drilling machine – justify. **02**
- Q.3**
- (a) (i) Explain any two milling cutters with neat sketch. **03**
(ii) A mild steel surface 75 mm wide and 175 mm long is to be slab milled with a HSS helical milling cutter 100 mm diameter 125 mm long having 12 teeth. A depth of cut of 10 mm is to be taken with a cutting speed of 0.5 m/s and a feed rate of 0.05 mm/tooth. What is the machining time and the power required for cutting? Take unit power for the operation to be $2.7 \text{ W/mm}^3/\text{s}$ and efficiency of transmission as 80%. **04**
 - (b) Calculate the correct indexing required for cutting 93 equally space divisions on the periphery of a cylindrical work piece. The change gear set available with the dividing head has 24 to 80 teeth in steps of 4 teeth. The indexing plate has 15, 16, 17, 18, 19 and 20 hole circles. Draw a schematic diagram of the set up to be used and indicate the direction of rotation of all the elements in the drive. **07**

OR

- Q.3**
- (a) (i) Sketch all the elements of plain milling cutter. **03**
(ii) Calculate the indexing required for following divisions. **04**
 - (1) 54
 - (2) $20^\circ 15'$

- (b) Determine the machine set up and indexing required to cut a 16 teeth helical slab milling cutter with right hand helical teeth on a universal milling machine with a 6 mm pitch right hand table screw. The diameter of the cutter required is 100 mm and the lead of the helix is 625 mm with a tooth depth of 10 mm. The standard 40:1 dividing head supplied with the machine is provided with the change gear set 20 to 120 teeth in steps of 4 teeth. Draw the schematic diagram of the machine set up showing all elements of the drive and table swivel. **07**
- Q.4 (a)** (i) Draw the tooth set of Saw and write application of each. **03**
(ii) Differentiate between Shaper and Planer **04**
- (b)** (i) A cast iron surface 375 mm long and 96 mm wide is to be machined on a shaper in one cut using a cutting speed of 0.40 m/s and feed rate of 0.24 mm/stroke. The cutting tool return time ratio for the shaper is 1.8 and the available ram cycles on the machine are 28, 40, 60 and 90 cycles per minute find **04**
1. Time required for cutting the job.
2. Average velocity during return stroke.
- (ii) List the Sawing machines and explain any one of them. **03**
- OR**
- Q.4 (a)** (i) Draw the sketch of internal pull type of Broach and label all the elements. **03**
(ii) Explain hydraulic Shaper mechanism **04**
- (b)** (i) A steel surface 225 mm long and 125 mm wide is shaped at 60 strokes/minute. The depth of cut is 3 mm and the feed rate is 0.3 mm/stroke. The ratio of cutting stroke to return stroke time is 1.6: 1. Given that, on an average in a shaping operation on steel 300 mm³ of material can be removed per sec for each kW of power at the cutting zone, find the power of motor required. The efficiency of the drive may be taken as 75%. **04**
(ii) List the Broaching machines and explain any one of them. **03**
- Q.5 (a)** (i) Explain Bond, Grade and Structure of grinding wheel. **03**
(ii) Determine the time required to grind 2000 cylindrical pins 30 mm diameter and 150 mm long on a centreless grinder with a 200 mm wide grinding wheel. It is suggested that the grinding be done in two passes. The regulating wheel speed may be taken as 0.5 m/s and the wheel tilt as 3° for roughing pass and 1° for finishing pass. **04**
- (b)** (i) Explain Hole basis system and Shaft basis system. **03**
(ii) Explain different types of Fits **04**
- OR**
- Q.5 (a)** (i) Explain centreless Grinding machine with operations. **05**
(ii) What does the symbol 62A14H11E15 on a grinding wheel signify? **02**
- (b)** (i) Explain Lapping super finishing process. **04**
(ii) Explain Honing super finishing process. **03**
