

Subject Name: Manufacturing Processes – I

Subject Code: 4TE04MPR1

Branch: Automobile Engineering

Semester: 4<sup>th</sup>

Date: 20/11/2015

Time: 2:30 To 5:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1

Attempt the following questions:

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- a) In ..... milling process, the feed direction and direction of rotation of cutter are in ..... direction: (i) up, opposite (ii) up, same (iii) down, opposite (iv) down, reverse.
- b) In shaper machine tool, work piece .... and tool .... (i) reciprocates, rotates (ii) remains stationary, rotates (iii) remain stationary, reciprocates (iv) rotates, reciprocates.
- c) In oxidizing flame, the inner core attains a temperature of .... °C.: (i) 2100 (ii) 2800 (iii) 3150 (iv) 3500.
- d) On drilling machine, which process is known as reaming? (i) Enlargement of existing hole (ii) Hole made by removal of metal along the hole circumference (iii) Smoothly finishing and accurately sizing a drilled hole (iv) All the above.
- e) The process of chamfering the entrance of a drilled hole is known as.... (i) Counter-boring (ii) counter-sinking (iii) counter-fillet (iv) trepanning.
- f) Which of the following operations is/are performed on a lathe machine? (i) Spot-facing (ii) Parting (iii) Reaming (iv) All the above.
- g) Which process squeezes metals into peaks and troughs with plastic deformation? (i) Grooving (ii) Knurling (iii) Reaming (iv) None of the above.
- h) The process of beveling sharp ends of a work piece is called as ..... (i) Knurling (ii) Grooving (iii) Facing (iv) Chamfering.
- i) The function of taper turning process is to .....: (i) reduce the diameter of a work piece along its length (ii) reduce the diameter by removing material about an axis offset from the axis of work piece (iii) remove the material from end surface of a work piece (iv) all of the above.
- j) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis? (i) Cross-slide (ii) Compound rest (iii) Apron (iv) Saddle.
- k) A flat surface can be produced by a lathe machine, if the cutting tool moves ...: (i) parallel to the axis of rotation of work piece (ii) perpendicular to the axis of rotation of work piece (iii) at an angle of 45° (iv) none of the above.
- l) Only two perpendicular components of cutting force act on the tool in case of



- .... cutting: (i) Oblique (ii) Orthogonal (iii) 3D (iv) Inclined.
- m) Operation of bending a partially cut hole on one side is called: (i) Nibbling (ii) Slitting (iii) Lancing (iv) Spiral.
- n) Which of the following is not a specification of lathe machine tool: (i) Chuck size (ii) Swing over diameter (iii) Distance between centers (iv) Bed length.
- Attempt any four questions from Q-2 to Q-8:
- Q-2 a) How is the selection of a manufacturing process influenced by the work piece material and the quantity of production? 07
- b) A lathe with a 6 mm pitch lead screw is used to cut inch pitch threads. If the end gear train set is 50 teeth gear on stud driving 63 teeth gear on intermediate shaft and 64 teeth gear on the same intermediate shaft driving 96 teeth gear on the lead screw, what is the t.p.i. cut? Also calculate the error (if any), introduced in the pitch cut by using this gear train? 07
- Q-3 a) How do you specify an Engine lathe? 07
- b) One hundred shafts of steel, 75 mm diameter and length 200 mm, are to be turned on a lathe in one cut each using a carbide tool. The suggested speed and feed for the above job are 1.67 m/s and 0.25 mm/rev. Estimate the total time required for the lot allowing 01 min for center hole drilling and 02 min for handling each piece. The spindle speeds available on the machine are 140, 200, 280, 400, 560 and 800 rpm. 07
- Q-4 a) Calculate the time required to drill a hole 25 mm diameter in a gray cast iron work piece 75 mm thick using a H.S.S drill. The cutting speed and the feed rate for the operation may be assumed to be 0.50 m/s and 0.5 mm/rev of the drill respectively. 07
- b) Discuss a typical Jig boring machine. Why is it expensive? 07
- Q-5 a) Two 80 mm wide  $\times$  180 mm long surfaces of a cast iron block are to be slab milled with a H. S. S. helical milling cutter 100 mm diameter and 125 mm long, having 12 teeth. A depth of cut of 8 mm is to be taken with a cutting speed of 0.5 m/s and a feed rate of 0.06 mm/tooth. What is the machining time, MRR and power required for cutting? Take unit power for the operation as 2.7 J/mm<sup>3</sup> and efficiency of transmission as 80 percent. 07
- b) What are the factors to be considered in selecting a hack saw blade? 07
- Q-6 a) A steel surface 225 mm long and 125 mm wide is shaped at 60 strokes/min. The depth of cut is 3 mm and the feed rate is 0.3 mm/stroke. The ratio of cutting stroke time to return stroke time is 1.6:1. Given that, on an average shaping operation on steel, 300 mm<sup>3</sup> material is removed per second for each kW of power at the cutting zone. Find the power of the motor required. The efficiency of the drive may be taken as 75%. 07
- b) Sketch a typical broach tooth profile and name its elements. 07
- Q-7 a) Calculate the time required to mill the 250  $\times$  100 mm surface of a cast iron block 250  $\times$  100  $\times$  75 mm in one cut. A H.S.S. helical slab mill 100 mm diameter and 125 mm long is to be used. The number of teeth on the cutter is 16. The allowable cutting speed for the operation is 0.5 m/s; feed is 0.25 mm/tooth and depth of cut is 5 mm. 07
- b) “Soft wheels are used for hard materials and hard wheels for soft materials” Explain. 07



Q-8

- a) A rectangular bar  $20 \times 15$  mm cross section is fed at the rate of 0.083 mm/s in to a grinding wheel of 250 mm diameter in a plunge cut grinding operation. The wheel is rotating at 2000 RPM and has a grit density of 3 grits/mm<sup>2</sup>. Find: i) M.R.R. ii) Work done if  $U = 38 \text{ J/mm}^3$  iii) Force per grit. 07
- b) Explain the basic methods of holding drills in a drilling machine spindle. 07

