Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VII • EXAMINATION – SUMMER • 2014

Subject Code: X 71902 **Date: 30-05-2014**

Subject Name: Production Technology

Time: 02:30 pm - 05:00 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)** Explain the significance of chip thickness ratio and the shear plane angle in orthogonal cutting operation. **07**

In an orthogonal cutting operation, the rake angle = 8°, chip thickness before the cut = 0.2 mm and the width of cut = 4.0 mm. The cutting velocity = 150 m/min and the chip thickness ratio = 0.4. The cutting force and feed force measured using dynamometer are 700 N and 450 N, respectively. Determine:

(i) chip thickness after the cut (ii) shear angle

(iii) friction angle (iv) Chip velocity

(v) shear velocity

(b) In a turning operation on stainless steel with hardness of 200 HB, the cutting speed = 180 m/min, feed = 0.25 mm/rev, and depth of cut = 4.0 mm. How much power will the lathe draw in performing this operation if the specific power for the turning operation is 2.2 J/mm^3 and the mechanical efficiency = 90%? **04**

Also calculate the cutting force.

(c) Write the objectives of using cutting fluids. **03**

What are different types of cutting fluids?

Q.2 **(a)** State some basic reasons for developing nontraditional machining processes. **04**

Give a classification of the nontraditional machining processes based on the mechanism of metal removal. Write the energy transfer media in each case.

(b) State the advantages of using jigs and fixtures. **03**

(c) Explain the following tool wear mechanisms: **07**

(i) Abrasion wear (ii) Adhesion wear (iii) Diffusion wear

OR

(c) Discuss different types of chips formed during cutting process along with their characteristics. **07**

Why discontinuous chips are preferred over continuous chips?

Q.3 **(a)** What are functions of dielectric fluid used in EDM? **05**

State the basic requirement of dielectric fluid used in EDM.

What are the dielectric fluids commonly used in EDM?

(b) Evaluate the following tool materials: **05**

(i) High speed steel (ii) Cemented carbide (iii) Ceramics

(c) Explain the purpose of the following elements of a die: **04**

(i) Bolster plate (ii) Pilot (iii) Stripper (iv) Pressure plate

OR

Q.3 **(a)** With the help of graphs, evaluate the effect of the following process parameters on the material removal rate in Ultrasonic Machining. **05**

(i) Abrasive grit size (ii) Frequency of vibration

(iii) Amplitude of vibration

(b) Sketch a single point cutting tool with positive rake and show on it various tool elements and tool angles. Give the function of each tool element. **05**

(c) Explain the following sheet metal operations: **04**

(i) Blanking (ii) Piercing (iii) Perforating (iv) Notching

Q.4	**(a)**	What is a transfer machine? Explain (i) in-line and (ii) rotary indexing type transfer machines.	**05**
	(b)	Explain various gear finishing processes.	**05**
	(c)	Explain the following locating elements used in jigs and fixtures: (i) V locators (ii) Concentric locators	**04**

OR

Q.4	**(a)**	Write the Taylor's tool life equation and plot the graph. Let $n = 0.5$ and $C = 600$ in the Taylor's tool life equation. What is the percent change in tool life (i) if the cutting speed reduced by 50% and (ii) if the cutting speed increased by 100%?	**05**
	(b)	Explain "Gear Hobbing" process in detail.	**05**
	(c)	Explain the following locating elements used in jigs and fixtures: (i) Radial locators (ii) Conical locators	**04**

Q.5	**(a)**	A steel blank 50 mm square having a 20 mm diameter hole in the centre is to be blanked from 1.5 mm thick sheet. Calculate: (i) the maximum punch force necessary to shear the blank in one operation if the ultimate shear strength of the material is 390 N/mm^2. (ii) the work done if the shearing operation is complete with 25% penetration of the punch. (iii) the amount of shear which must be ground upon the tool, if the maximum punch force is to be reduced to 50 kN.	**05**
	(b)	Explain the following types of multi spindle automats: (i) Progressive action (ii) Parallel action.	**05**
	(c)	Explain the following clamping elements: (i) Strap clamps (ii) Wedge clamp	**04**

OR

Q.5	**(a)**	With the help of suitable sketches and examples, write the differences between a compound die and a progressive die.	**05**
	(b)	State the differences between Single spindle and Multispindle automats.	**05**
	(c)	Explain the following clamping elements: (i) Edge clamp (ii) Heel clamp	**04**

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