Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 712802N **Date: 09-01-2013**

Subject Name: Machining Science

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)**	What is the basic mechanism of cutting tool wear? Explain with sketch progressive tool wear, diffusion wear and crater wear.	**07**
	(b)	What are the factors that consider for selection of grinding wheels? Discuss external and internal cylindrical grinding processes.	**07**
Q.2	**(a)**	Differentiate between orthogonal and oblique cutting. Discuss with neat sketch mechanism of chip formation.	**07**
	(b)	Draw neat sketch of merchant's circle diagram and derive the following relation for tangential cutting force (*Ft*) and shear force (*Fs*). $$Ft = Fs\left[\frac{\cos(\beta-\alpha)}{\cos(\phi+\beta-\alpha)}\right]$$ Where, Ø = shear plane angle β= angle of friction α = tool rake angle.	**07**
		OR	
	(b)	Enlist the different types of dynamometer used for turning operation. Explain working principle of strain-gauge dynamometer.	**07**
Q.3	**(a)**	Draw and discuss the single point cutting tool specification in ASA and ORS.	**07**
	(b)	With neat sketch explain different types of chips.	**07**
		OR	
Q.3	**(a)**	Explain work tool contact and kinematics of work tool interaction as an important machining fundamental.	**07**
	(b)	Define cutting tool life. State the factors which affect tool life.	**07**
Q.4	**(a)**	Discuss concepts of rake angle measured in different planes for oblique turning operation.	**07**
	(b)	Explain any two methods for experimental determination of cutting temperature.	**07**
		OR	
Q.4	**(a)**	What do you understand by mechanism of yielding for chip formation?	**07**
	(b)	Derive an equation of flow due to conduction to know heat generation in metal cutting.	**07**

Q.5	**(a)**	Explain maximum production cost criterion and maximum production rate criterion for economic machining	**07**
	(b)	What is ideal and natural surface roughness? Discuss factors that affect surface quality during machining of job material.	**07**

OR

Q.5	**(a)**	What is the mechanics of grinding process? Explain honing and lapping operation.	**07**
	(b)	What are the different restrictions on cutting condition? How the cutting fluid help in this matter.	**07**

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