

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 (F_t) and shear force (F_s). **07**

$$F_t = F_s \left[\frac{\cos(\beta - \alpha)}{\cos(\phi + \beta - \alpha)} \right]$$

Where, ϕ = shear plane angle
 β = angle of friction
 α = tool rake angle.

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**
