

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## **Kadi Sarva Vishwavidyalaya**

### **M.E.SEM. Ist PRODUCTION ENGG. EXAMINATION JAN 2013**

**Subject code:**

**Time: 3 Hours**

**Subject Name: Machining Science**

**Total Marks: 70**

**Instructions:**

**Dt: 22/1/13**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Illustrate your answer with neat sketches wherever required.

#### **SECTION-I**

Q.1 Each carries equal marks [15]

- [A] Explain the mechanism of built edge formation.
- [B] Differentiate between Orthogonal and Oblique Cutting.
- [C] Draw and show the main geometrical features and angles of single point tools in ORS systems.

**OR**

- [C] Draw the planes and axes used for expressing tool geometry in ASA system for turning operation.

Q.2 [10]

- [A] Write advantage, disadvantage and procedure for Merchant's Circle Diagram.
- [B] Mild steel rod is being turned at the speed of 27.3 m/min. Feed rate used is 0.25 mm/rev, and deformed chip thickness is equal to 0.30 mm. Rake angle and shear angle of the tool are  $20^\circ$  and  $30^\circ$ , respectively. Calculate the shear flow velocity.

**OR**

Q.2 [10]

- [A] Draw force circle diagram proposed by Merchant for orthogonal cutting conditions showing different forces acting on tool, chip, and work system.
- [B] From the Merchant diagram for orthogonal cutting, derive the expression for
  - (a) shearing force on the shear plane,
  - (b) Friction force on the tool face in terms of cutting force, thrust force, rake angle, and shear angle.

Q.3 [10]

- [A] Explain any thin zone model.
- [B] Explain Okushima and Hitomi thick zone model.

**OR**

Q.3 [10]

- [A] Explain slip line field method.
- [B] Discuss the role of friction in Metal Cutting.



## SECTION-II

- Q.4 Each carries equal marks [15]  
[A] Derive the relationship between velocity and force for Oblique cutting.  
[B] Explain the use and working of drill dynamometer.  
[C] Write the experimental methods of measurement of cutting forces in turning.

OR

- [C] Write the experimental methods of measurement of cutting forces in milling. [10]  
Q.5 [A] Define progressive, Flank and Crater tool wear.  
[B] Explain the effect of cutting speed on tool life in the turning processes.

OR

- Q.5 [A] Explain the maximum production rate criterion. [10]  
[B] Write the selection criterion for grinding wheels.

- Q.6 [A] Write the experimental method for determination of cutting temperature. [10]  
[B] Explain infrared photographic technique.

OR

- Q.6 [A] Explain honing and lapping operations. [10]  
[B] Explain the effect of the application of a cutting lubricant on the power criterion in orthogonal cutting.