

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

DEPARTMENT OF PRODUCTION ENGINEERING

MID SEM EXAM, SEPT-2015

Subject: Theory of Metal Cutting (TMC)

Full Marks: 20

Semester: B.Tech, 5th Sem

Time: 2 hours

Answer all questions

Q.1. Answer the following question:

[1×5]

- (a) What are the basic properties of cutting tool material ?
- (b) Why side clearance angle is provided on a cutting tool ?
- (c) What are advantages of positive rake angle of single point cutting tool ?
- (d) Differentiate between orthogonal and oblique cutting ?
- (e) Name the conditions that favor built up zone formation. What are the advantage and disadvantages of BUE formation ?

Q.2. (a) During an orthogonal cutting experiment using a tool with 10° rake angle, 75° principal cutting edge angle and 7° end cutting angle, it was observed that

Cutting force=1500N. , Feed force=1000N. , Cutting Velocity=120m/min., Feed=0.3mm/rev. and Chip thickness=0.6mm.

Calculate [2.5×2]

- (i) Magnitude of forces on tool face, (ii) Magnitude forces on Shear plane, (iii) Resultant cutting force
- (b) Use the above data and calculate the following
 - (i) Cutting Power, (ii) Specific Cutting energy, (iii) Dynamic yield Shear strength of the work material
 - (iv) Chip flow velocity and shear velocity, (v) Shear Strain in chip, (vi) Strain rate, (vii) Maximum pick to valley height

Q.3 Answer any one

(a) A single point cutting tool is designated as 0°-8°-5°-8°-15°-90°-0.8mm in ORS. Determine the designation of the same cutting tool in ASA.

(b) Write short notes on any two

[5×1]

- i. Tool materials
- ii. Merchant's forces circle
- iii. MRR of Drilling

[2.5×2]

Q.4. (a) Answer any two

- (i) In straight turning of low carbon steel bar, the uncut chip thickness is 0.2mm. The longitudinal feed is 0.2mm/rev. The orthogonal rake is 12° . Calculate the principal cutting edge angle.
- (ii) The back rake of a single point turning tool is 10° . The orthogonal rake and inclination angle of the same tool is 7° and 10° respectively. Calculate the principal cutting edge angle.
- (iii) The principal cutting edge angle of a single point cutting tool is 90° . The same tool with an orthogonal rake angle of 0° is employed for turning with a longitudinal feed of 0.3 mm/rev. The chip thickness is 0.60 mm/rev. Determine the shear angle.

(b) Answer any two

- (i) Turning of a 200mm diameter steel bar is undertaken at a cutting velocity of 120mm/min. The depth of cut and feed of 4mm and 0.1mm/rev respectively. Determine material removal rate in mm^3/s .
- (ii) With suitable example explain tool Signature.
- (iii) What are the significances of rake angle and clearance angle of drill?

ALL POWER WITHIN YOU; YOU CAN DO ANYTHING & EVERYTHING, NOTHING IS IMPOSSIBLE IN REAL WORLD, IT WILL POSSIBLE WHEN YOU KNOW TO YOURSELF.