



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/ME(O)/SEM-5/ME-504/2012-13

2012

TECHNOLOGY OF MACHINING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) The point angle is HSS twist drill is

- a) 60°
- b) 118°
- c) 128°
- d) 90°.

ii) A grinding wheel is specified by

- a) grain size
- b) grit size
- c) grade
- d) all of these.

iii) A lead screw with half nuts in a lathe, free to rotate in both directions has

- a) V-threads
- b) Whitworth threads
- c) Acme threads
- d) fine threads.

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- iv) Cemented carbide tools are generally provided with
- a) positive back rake angles
 - b) negative back rake angles
 - c) zero back rake angles
 - d) none of these.
- v) The usual ratio of forward and return stroke in quick return mechanism in shaping machine is
- a) 3 : 2
 - b) 3 : 1
 - c) 2 : 1
 - d) 2 : 3.
- vi) Forces due to metal cutting are measured by
- a) rotameter
 - b) tachometer
 - c) dynamometer
 - d) micrometer.
- vii) Which of the following is the hardest cutting tool material next only to diamond ?
- a) Ceramics
 - b) Cubic boron nitride
 - c) Cemented carbide
 - d) Coated carbide.
- viii) Enlarging an existing circular hole with a rotating single point tool is called
- a) reaming
 - b) boring
 - c) drilling
 - d) internal turning.
- ix) Tool wear in carbide tool takes place due to
- a) diffusion
 - b) adhesion
 - c) abrasion
 - d) all of these.
- x) In 18-4-1 HSS, the ratio corresponds to
- a) W : Cr : V
 - b) W : V : Cr
 - c) V : Cr : W
 - d) Cr : V : W.



GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

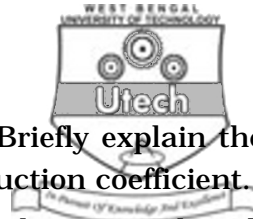
2. Prove that the Cutting Velocity (V_c) is always greater than the Shear Velocity (V_s).
3. Explain with a neat sketch any one method of taper turning in a lathe machine.
4. Differentiate between Capstan and Turret lathes.
5. A grinding wheel is specified with the following markings :
300 × 30 × 35 W A 36 M 5 S 17
Explain the specification.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

6. a) State the condition under which uses of positive and negative rake angles are recommended.
b) What is "Cryogenic machining" ? Explain briefly.
c) Following observations were made during an orthogonal cutting operation :
Tool rake angle : 10° , Coefficient of friction : 0.85,
Chip thickness : 2.5 mm, Width of cut : 15 mm,
Cutting speed : 40 m/min, Feed : 1.5 mm/rev, Shear strength : 650 N/mm^2 .
Determine the following :
i) Chip thickness ratio
ii) Shear angle
iii) Shearing force
iv) Friction angle
v) Cutting force. $4 + 3 + 8$
7. a) Why are rake and clearance angles provided on cutting tools and on what factors do the values of these angles depend ?



- b) What is chip reduction coefficient ? Briefly explain the effect of cutting variables on chip reduction coefficient.
- c) A work piece of 300 mm diameter and 600 mm length is to be turned down to 282 mm for the entire length. The suggested feed is 1.2 mm/revolution and the cutting speed is 162 m/min. The maximum allowable depth of cut is 4.5 mm. Calculate the following :
- i) Spindle r.p.m.
 - ii) Feed speed
 - iii) Material removal rate
 - iv) Cutting time. 3 + 5 + 7
8. a) Explain the quick return mechanism.
- b) Differentiate between shaping and planning.
- c) A cast-iron surface 300 mm long and 180 mm wide is to be machined on a shaper with cutting to return ratio of 3 : 2. Cutting speed, feed and clearance are 24.6 m/mm, 2 mm/double stroke and 30 mm respectively. The available ram strokes on the shaper are 28, 40, 60 and 60 /min. If the depth of cut is 3.5 mm, determine :
- i) time required in machining the surface
 - ii) material removal rate 4 + 4 + 7
9. a) What for lapping is used ? How much stock is left for lapping ? How does it differ from grinding ?
- b) Explain the working principle of the centre-less grinding operation.
- c) Write a short note on thread rolling. 3 + 6 + 6
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