



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 :  $10 \times 1 = 10$

i) The point angle of HSS twist drill is

- |                |                 |
|----------------|-----------------|
| a) $60^\circ$  | b) $118^\circ$  |
| c) $128^\circ$ | d) $90^\circ$ . |

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

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

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

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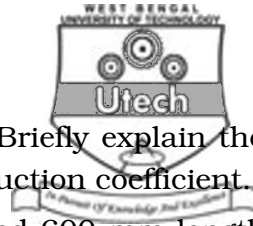
**GROUP – B****( Short Answer Type Questions )**Answer any *three* of the following. $3 \times 5 = 15$ 

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 :  $10^\circ$ , 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 :  $650 \text{ N/mm}^2$ .  
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 ?

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- 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 :
- Spindle r.p.m.
  - Feed speed
  - Material removal rate
  - 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/min, 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 :
- time required in machining the surface
  - 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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