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.

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 × 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 × 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