Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(ME)/SEM-5/ME-504/2011-12

2011

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) A cutting tool can never have its
      a) rake angle-positive
      b) rake angle-negative
      c) clearance angle-positive
      d) clearance angle-negative.

   ii) Relief angle on HSS tool usually varies from
      a) 3° to 10° b) 11° to 15°
      c) 16° to 20° d) 22° to 27°.

   iii) In lathe, the spindle speed will be minimum in
      a) plane turning b) thread cutting
      c) taper turning d) finishing.

iv) Backlash eliminator is used in

a) upmilling b) downmilling

c) gang milling d) none of these.

v) In maching Merchant's Circle diagram deals with

a) tool geometry

b) mechanism of chip formation

c) mechanics of maching

d) tool life.

vi) Taylor's tool life equation is expressed by

a) $TV^n = C$ b) $VT^n = C$

c) $(VT)^n = C$ d) $VT = C$.

vii) The straight teeth of internal spur gears can be produced in

a) milling machine b) gear shaping machine

c) hobbing machine d) planing machine.

viii) A cam shaft is always provided in

a) centre lathes

b) capstan lathes

c) turret lathes

d) single spindle automatic lathes.

ix) Broaching is primarily done for

a) Better finishing

b) Mass production

c) Cylindrical work piece

d) Hard work piece.

x) In grinding operation, which one acts as a cutting tool ?

a) H.S.S. tips b) Diamond tips

c) Carbide tips d) Abrasive grains.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) What is the combined effect of feed and nose radius on surface roughness ?

   b) How does tool failure take place ? 2 + 3

3. Distinguish between Mass production and Batch production.

4. State the causes and effects of formation of built-up edge (BUE) in machining.

5. Sketch a plain milling cutter and show its orthogonal rake and orthogonal clearance.

6. A high speed steel tool is used for maching a job at a cutting speed of 35 m/min and has a tool life of 55 mins. Find the tool life at a cutting speed of 40 m/min. Assume $n = 0{\cdot}13$.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) The following data was obtained from the orthogonal cutting test :

   Rake angle = 20°

   Depth of Cut = 6 mm

   Feed rate = 0·25 mm/rev

   Chip length before cutting = 29·4 mm

   Chip length after cutting = 12·9 mm

   Vertical cutting force = 1050 N

   Horizontal cutting force = 620 N

   Using Merchant' analysis calculate :

   i) direction and magnitude of resultant force

   ii) shear plane angle

   iii) friction force and friction angle.

b) Find approximate time required to drill a 18 mm diameter hole in an M.S. Plate of 15 mm thickness having an approach length of 5 mm with no over travel permitted employing 212 rpm and feed of 0·2 mm/rev.

c) What is machinability and machinability index ?

10 + 3 + 2

8. a) A hole of 25 mm diameter and 35 mm depth is to be drilled in a MS component. The cutting speed is 35 m/min and feed rate is 0·20 mm/rev. Calculate :

i) Machining time

ii) Material removal rate

b) It is required to divide the periphery of a job into 50 equal divisions. The index plate supplied is 15, 16 17, 18, 19, 20 holes. Find the crank movement.

c) Explain Honing and Lapping process. 5 + 5 + 5

9. a) Describe the working and construction of crank and slotted quick return mechanisms of a shaper.

b) What is Jig boring machine ? Describe the different measuring systems employed in Jig boring machines.

c) Obtain indexing for 51 divisions. 5 + 5 + 5

10. a) State the basic purposes of machining, grinding and super finishing.

b) With the help of suitable diagram, briefly describe how external screw threads are produced by thread rolling and centreless grinding. 5 + 10

11. a) Describe the different types of chip formation during cutting operation.

b) Describe "Geneva Mechanism" in Turret Lathe.

c) Explain different types of job holding and supporting devices in a lathe. 5 + 5 + 5