ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER – 2006

TECHNOLOGY OF MACHINING

SEMESTER – 5

Time : 3 Hours] [Full Marks : 70

Group – A

(Multiple Choice Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) If '*t*' is the thickness of undeformed chip in mm, 'ϕ' is the side cutting edge angle of the single point tool and '*s*' is the feed in mm/rev, then

a) $t = s. \sin \phi$ b) $s = t. \sin \phi$

c) $t = s. \cos \phi$ d) $s = t. \cos \phi$.

ii) Back rake angle of a single pont tool is the angle

a) by which the face of the tool is inclined sideways

b) by which the face of the tool is inclined towards back

c) by which the face of the tool is inclined with the flank

d) none of these.

iii) 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.

iv) Stellite is the trade name for

a) ceramics b) ferrous cast alloys

c) cemented carbide d) non-ferrous cast alloys.

v) In orthogonal cutting system, the cutting edge is

a) in line with direction of tool travel

b) perpendicular to the direction of tool travel

c) perpendicular to shear plane

d) none of these.

vi) The usual ratio of forward and return stroke in shaper is

a) 2 : 3 b) 1 : 2

c) 2 : 1 d) 3 : 2.

vii) The spindle speeds in a cutting tool are 160, 229, 328, 496, ... The next higher speed will be

a) 642 b) 660
c) 671 d) 695.

viii) Size of the planer is specified by

a) size of the table
b) length of stroke
c) size of table & height of cross rail
d) H.P of motor.

ix) A burr is

a) short piece of hardened chip
b) similar to BUE
c) sharp edge remaining on metal after machining
d) rough surfaces.

x) In centreless grinding operation the regulating wheel is inclined at

a) 0° - 8° b) 9° - 12°
c) 12° 15° d) 15° - 20°.

xi) A spur gear having 48 teeth and 3 mm module has outside diameter a

a) 150 mm b) 149·8 mm
c) 151·2 mm d) 152 mm.

xii) The usual ratio of forward and return stroke in a shaper is

a) 2 : 3 b) 3 : 2
c) 2 : 1 d) 1 : 2.

xiii) The size of a shaper is specified by

a) size of a bed b) stroke length
c) power of a motor d) type of drive.

xiv) Chip thickness ratio is defined as

a) $\frac{t_1}{t_2}$ b) $\frac{t_2}{t_1}$
c) $t_1 t_2$ d) none of these

where, t_1 = uncut chip thickness
t_2 = chip thickness.

Group - B

(Short Answer Questions)

Answer any *three* questions.

2. a) What are the important characteristics of a cutting tool material ? 2

b) What are the different types of carbide tools used for turning ? Mention their compositions. 3

3. a) What are the different types of chip formed during machining under different conditions ? 2

b) Determine the value of shear angle and dynamic cutting strain if the chip thickness be 0·5 mm while turning steel rod at a feed of 0·25 mm/rev and 3 mm depth of cut by a carbide tool of geometry of

0° – (– 6°) 6° – 6° – 15° – 75° – 0·5 mm (ORS). 3

4. With the aid of neat sketches indicate the tool geometry of a turning tool having (– 5°) – 10° – 6° – 6° – 8° – 75° – 0·8 mm (ORS) shape. 5

5. During machining of C-40 steel, a double carbide cutting tool of 0° – 10° – 6° – 6° – 8° – 75° – 1 mm (ORS) shape has been used. Calculate the back rake, side rake, front clearance and side clearance in ASA system. Assume any data or dimension, if required. 5

6. a) How does the tool failure take place ? What is meant by tool life ? 3

b) Machining steel with tool '*A*' and tool '*B*' gave tool life equation $VT^{0.12} = 60$ and $VT^{0.22} = 85$. Find out the cutting speed at which both the tool possess the same tool life. 2

7. a) What is the combined effect of feed and nose radius on surface roughness ? 3

b) Identical straight turning operation was carried out using two tools : 8° – 8° – 5° – 5° – 5° – 25° – 0" (ASA) and 8° – 8° – 5° – 5° – 7° – 30° – 0" (ASA). Indicate which of the tools will give better surface finish in terms of peak-to-valley height. 2

Group - C

(Long Answer Questions)

Answer any *three* questions.

8. a) What are the different methods of gear cutting ? Sketch the set-ups indicating tool-work motions. 7

b) A grinding wheel is specified by 49A36M7V24. Explain the specifications. With the aid of a sketch explain 'cylindrical grinding'. 8

9. a) With the aid of sketch explain the following thread manufacturing **methods** :

i) Thread milling

ii) Thread rolling.

Indicate the relative productivity. 7

b) With the aid of sketches explain the following : 8

i) Lapping of slip gauges

ii) Honing a hole.

10. a) Differentiate between a Capstan lathe and a Turret lathe. Sketch the tooling set-up for turning a 12 mm dia × 50 mm long cylindrical MS pins. 7

b) Sketch a Geneva mechanism. How does it function in a single spindle Automatic lathe ? 8

11. a) With the aid of a sketch explain the advantages of using steady rest and a follower rest. 7

b) What are the different types of chucks used in lathe ? Sketch them and explain their uses. 8