i) Time required machining the surface &

ii) Material removal rate.

(b) What are the basic elements or components of jigs and fixtures?

c) What are the different methods of application of cutting fluid? 5+5+5

9. (a) Distinguish between mass production and batch production 5

b) What is piece production? How does it differ from batch production? 5

c) What is honing and lapping? Explain through neat diagrams.

10. a) Derive the expression for chip thickness ratio? 5

b) What do you understand by machinability rating? Name one method of it. 3

c) The following data are recorded while turning a mild steel rod on a lathe.

Cutting speed = 30m/min, feed rate = 0.25 mm/rev, depth of cut =2, Tool life = 90 min

The following tool life equation is given by the equation $V T^{0.12} f^{.07} t^{0.3} = C$. If the cutting speed is increased by 25%, what will be the effect on tool life? 5

d) Explain centre less grinding. 2

11. a) Distinguish between CNC and DNC? 3

b) What are the different methods of gear cutting? Sketch any one set-ups indicating tool-work motions. 5

c) What is Geneva mechanism? 3

d) What is Machining centre? Describe its advantages. 4

_____x-x-x_____

CS/B.Tech(ME)/Even/6th Sem/ME-602/2014

2014

Machining Principles & Machine Tools

Time Allotted : 3 Hours *Full Marks : 70*

The figure 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 alternative from the following? 10x1=10

i. Tool life is most affected by –

a) cutting velocity b) assist in changing speed
c) hardness of the workpiece d) all of these

ii. Dynamometers are used to measure the –

a) cutting velocity b) cutting forces
c) chip thickness d) volume of metal cut

iii. Chip formation in turning a steel bar is basically a –

a) simple shearing process
b) tearing process
c) plastic deformation process
d) shearing and tearing combine process

iv. The NC controller of any machine tools does not contain –

a) MCU b) DPU c) BLU d) CLU

v. There is no lead screw in –
   a) Centre lathe
   b) Milling machines
   c) Single-spindle automatic lathes
   d) Hydraulic copying lathes

vi. In hydraulically driven machine tool, the feed rate is controlled or varied by –
   a) Relief valve b) Foot valve
   c) Pilot valve d) Throttle valve

vii. The process which cannot be called performing is –
   a) Rolling b) Forging c) Machining d) Welding

viii. During drilling by HSS twist drill, the drill is not subjected to–
   a) Axial force b) Transverse force
   c) Tangential force d) Any of the above

ix. The maximum chip thickness in plain milling is governed by–
   a) Cutter diameter b) Feed per tooth
   c) Depth of cut d) All of the above

x. The machining chips will be discontinuous type and of irregular size and shape, if the work material being machined in a lathe is –
   a) Mild steel b) Wrought iron
   c) Stainless steel d) grey cast iron

Group-B
(Short answer type questions)
Answer any *three* of the following

3x5=15

2. State the basic purposes of machining & grinding.
3. Distinguish between drilling & boring w.r.t. tool work motions and purposes.
4. Why does machining chips become thicker after cut?
5. What do you mean by grindability?
6. How is a grinding wheel specified?

HTTP://WWW.MAKAUT.COM

HTTP://WWW.MAKAUT.COM

CS/B.Tech(ME)/Even/6th Sem/ME-602/2014

Group – C
(Long answer type questions)
Answer any *three* of the following

3x15=45

7. a) During turning a steel round of 160 mm diameter at 560 rpm employing a feed of 0.32 mm/rev and depth of cut as 4mm by a ceramic insert having nomenclature 0, -10°, 6°, 6°, 15°, 75°, 0(mm), the following observations were made:

   Cutting force = 1600 N, Thrust force = 828 N and chip thickness = 1 mm.

   Using Merchant circle diagram (MCD), Compute the following?
   i) Friction force on tool rake face and corresponding normal reaction
   ii) Resultant force
   iii) Shear force and corresponding normal force
   iv) Co-efficient of friction between tool-chip interface
   v) Cutting power and specific cutting energy

   b) Explain the mechanics of grinding. Why are grinding wheels rotated at high rpm? What is meant by sparking-out time in reaction to plunge grinding? (5x2)+5=15

8. a) A cast – iron surface 300mm long and wide is to be machined on a shaper with cutting-to-return ratio of 3 : 2. Cutting speed, feed and clearance are 24 m/min, 2mm/ double stroke and 30mm respectively. The available ram strokes on the shaper are 28, 40, 60 and 90 strokes/min. If the depth of cut is 3.5 mm. Determine –

HTTP://WWW.MAKAUT.COM