

Roll Number: _____

Thapar Institute of Engineering & Technology, Patiala

Department of Mechanical Engineering

Mid Semester Examination

March, 2018

BE- 4th Semester

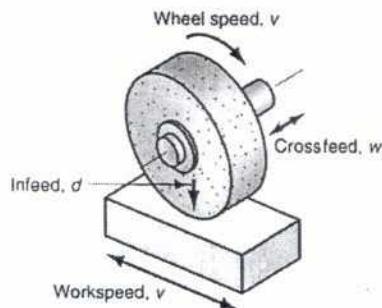
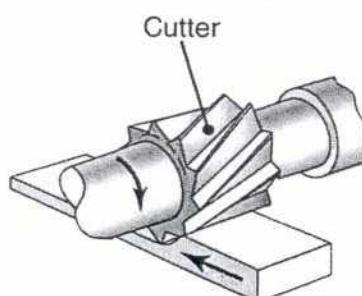
Time: 02 Hours; MM: 60

UTA002: Manufacturing Processes

Name of Faculty: VJ, DG, ATS, HNV, GLK, APS, RSJ,
RK, SAT

NOTE: Do all questions in sequence; assume suitable missing data, if any.
Mention your group number on the top of answer sheet.
Support your answers with neat sketches wherever required.
All questions are compulsory and carry equal marks.
Use handout for Q 3 (a).

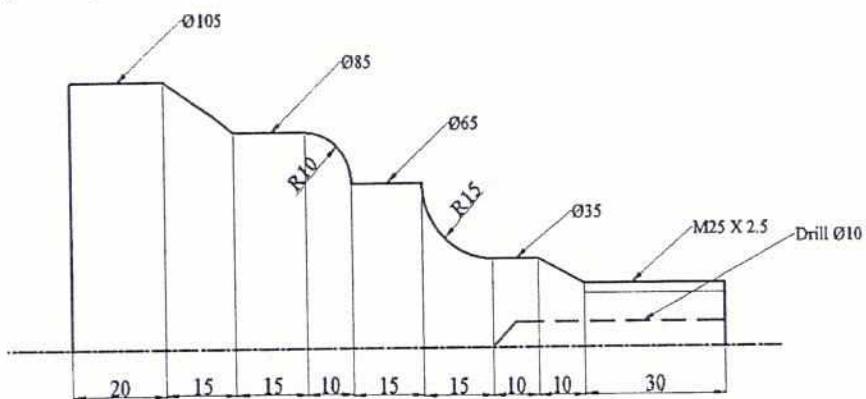
		Marks
Q1.	(a) What is chip thickness ratio in metal cutting? Schematically show the various shear zones during cutting process.	05
	(b) Schematically show the grinding wheel structure and explain its significance.	05
	(c) A cylindrical part of 50 mm diameter is to be turned down to 48 mm diameter on a standard lathe. The length of the workpiece to be turned is 200 mm and the tool has a pre-travel of 5 mm. The feed is 0.1 mm/rev and the depth of cut is 1 mm. If the machine produces 50 parts per hour find (a) Cutting speed (corresponding to original diameter of the job) (b) Material removal rate.	10
Q2.	(a) Calculate the (a) Final length of the strip, (b) rolling force for Stainless steel strip rolled at 1000°C. The dimension of the initial material are 1000 mm long, 40 mm wide and 10m thick has to be rolled to the thickness of 7mm. The width of the plate increases by 3%. The roll radius is 200mm and it rotates at 200 rpm respectively. The flow stress of work material is 420 MPa.	05
	(b) Graphically represent the effect of temperature on strength & ductility of the material during forming process.	03
	(c) What are the significant differences between the operations shown below:	04



- (d) The tool life equation for HSS tool is given by $VT^{1/7} = C_1$ and for carbide $VT^{1/5} = C_2$. For a cutting speed of 24 m/min, the tool life for both the tools is 130 min. Compare the tool life of two cutting tools (HSS and carbide) at a speed of 30 m/min. 08

Q3. (a) Write a CNC part program for the given component using canned cycle. All dimensions in mm. Consider following parameters during machining: 15

- Spindle speed during turning, drilling and threading operation is 2000, 1000 and 500 rpm, respectively.
- Feed rate during rough and finish cycles in turning are 100 and 50 mm/min, respectively.
- The depth of cut during roughing operation is 0.5 mm and finishing allowance in both directions is 0.1 mm.
- Feed rate in drilling cycle is 60 mm/min.
- The incremental depth of cut and tool retract distance in drilling are 0.5 and 1 mm, respectively.
- The included angle of thread is 60°. No. of finishing passes are 5. Finishing allowance is 10 µm. Minimum and maximum depth of cut for threading is 50 and 100 µm, respectively.



(b) According to ASA system (machine reference system), identify all the 7 tool parameters in tool signature: 1-8-9-12-16-15-0.7 and show them (three views) on a single point tool. 05

Hand Out

G00 X_Z_ – Rapid transverse
G01 X_Z_F_ – Linear motion with feed
G02 X_Z_R_F_ – Tool movement in clockwise direction
G03 X_Z_R_F_ – Tool movement in anti-clockwise direction
G20 – Inches mode
G21 – Metric mode
G28 U_W_ – Go to machine home position in incremental mode
G98 – Feed in mm/min
G99 – Feed in mm/rev
U – Incremental mode in X- axis
W – Incremental mode in Z- axis
X – Absolute mode in X- axis
Z – Absolute mode in Z- axis
Multiple turning cycle: G71 U_R_
G71 P_Q_U_W_F_
Finishing cycle: G70 P_Q_F_
Drilling cycle: G74 R_
G74 X_Z_Q_F_
Threading cycle: G76 P(m)(r)(a) Q_R_
G76 X_Z_P_Q_F_
M03 – Spindle rotation in clockwise direction
M04 – Spindle rotation in anti-clockwise direction
M05 – Spindle stop
M06 – Tool change
M30 – Program Stop and Rewind