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Roll Number:_____

Thapar University Patiala

Department of Mechanical Engineering

Mid Semester Examination

26th September, 2016

BE- 3rd Semester — UTA002: Manufacturing Processes

Time: 02 Hours; MM: 70 — Name of Faculty: AB, VJ, DG, ATD, HNV, DM, RKS

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 7.

Q 1	i) Identify the different terminologies used in single point cutting tool as shown in Figure 1.	6

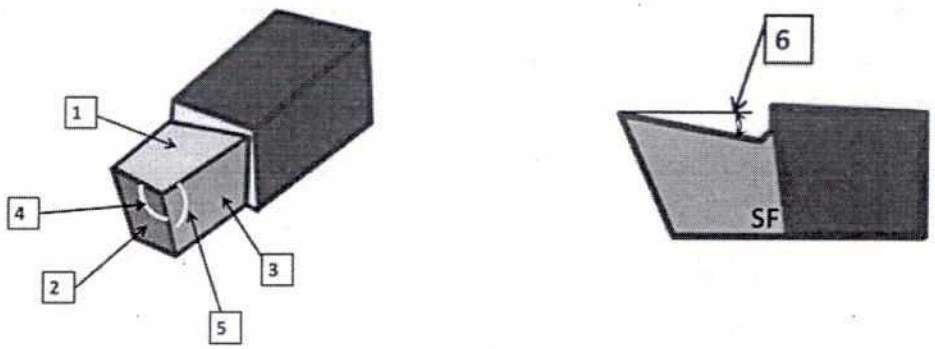
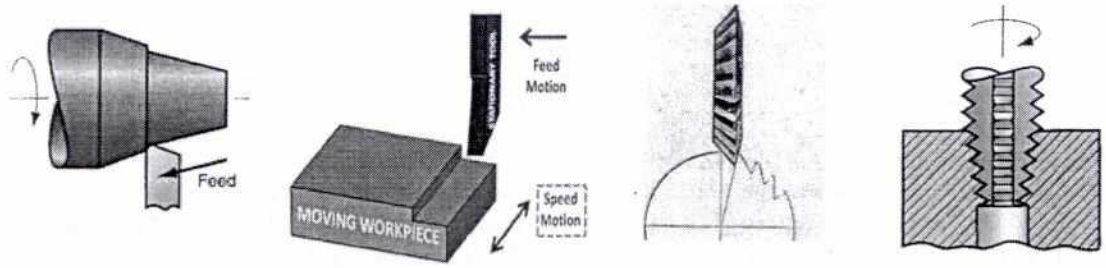


Figure 1 Single point cutting tool

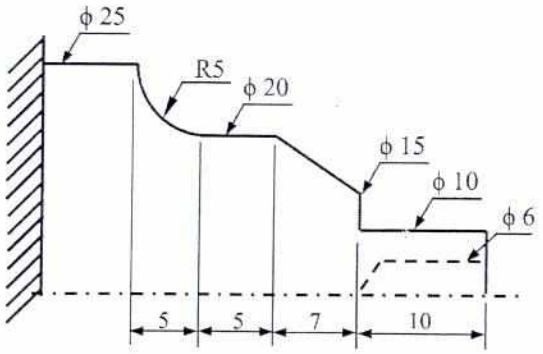
ii) Write the name of each machining operation as shown in Figure 2. — 4



(a) (b) (c) (d)

Figure 2

Q2	A cylindrical stainless steel rod with length 250 mm and diameter 160 mm is to be turned to diameter of 140 mm. The operator decides to turn the rod by number of roughing cuts and a final finishing cut. Calculate the total time required for machining the component. Assume feed 0.62mm/rev, cutting speed 60m/min and depth of cut 3 mm per pass for roughing cut. The finishing cut, assume the feed as 0.1 mm/rev, cutting speed 150m/min and depth of cut 0.5 mm. Assume pre-travel length of 12mm for each cut.	10

Q3	A cold rolling operation is to be used to reduce a 50 mm thick and 200 mm wide copper plate. The entering velocity of the plate is 15 m/min and the exit velocity is 18 m/min. The coefficient of friction is 0.2 and assuming that the reduction in thickness during this process is the maximum draft permissible. If the plate widens by 5% after rolling, calculate the power required to drive the rolls. Assume average flow stress of the material as 180 MPa.	10
Q 4	a) What are the various alloying elements added to low alloy steel and how they affect the various mechanical properties? b) Show the regions of primary and secondary shear zones? What are the favorable conditions/reasons for BUE formation during machining of mild steel?	6 4
Q5	A component shown in the Figure 3 is to be manufactured on a CNC machine. Write the CNC part programme to prepare the component by properly marking the workpiece reference point on the answer sheet. Consider, (i) Spindle speed during turning and drilling operations are 2000 and 800 RPM, respectively. (ii) Feed rate during rough and finish turning are 90 and 40 mm/min, respectively. (iii) Feed rate during drilling is 30 mm/min. (iv) Depth of cut during rough turning is 0.5 mm, finishing allowance is 0.1 mm and tool retract distance is 1 mm. (v) Depth of cut and tool retract distance in drilling are 0.5 and 1 mm, respectively.  All Dimensions are in mm **Figure 3**	10
Q6	Tool life of 25 min was obtained at a cutting speed of $v = 60$ m/min and tool life for the same tool was 80 min while operating at the cutting speed of $v = 18$ m/min. The operator is required to do turning forreducing the diameter from 30 mm to 20 mm of a cylindrical job with length 100 mm (while holding the job on the lathe, 10% of its total length is used for gripping in the chuck). The operation is performed at the cutting speed $v = 25$ m/min and the feed, $f = 0.4$ mm/rev. (i) Develop the tool equation? (ii) Calculate the tool life? (iii) How many parts can be manufactured using the given tool at the cutting speed of 25 m/min?	10
Q7	a) Explain the terms related to grinding process: (i) Wheel glazing, (ii) self-sharpening. Also show (graphically) the variation in MRR with volume of wheel wear with all possible regions. b) How conventional milling does differ from climb milling. Which process gives better surface finish and why?	6 4

HAND OUT:

G00 X_ Z_ – Rapid transverse
G01 X_ Z_ F_ – Linear motion with feed
G02 X_ Z_ R_ – Tool movement in clock wise direction
G03 X_ Z_ R_ – Tool movement in clock wise direction
G04 – Dwell time (or, waiting time)
G17 – XY plane
G20 – Inches mode
G21 – Metric mode (in mm)
G28 U_ W_ – Go to machine home position in incremental mode
G70 P_ Q_ F_ – Finishing cycle
G90 X_ Z_ F_ – Straight turning cycle
G94 X_ Z_ F_ – Facing cycle
G98 – Feed in mm/min
G99 – Feed in rev/min
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_
Multiple drilling cycle:	G74 R_
	G74 X_ Z_ Q_ F_
Multiple threading cycle:	G76 P(m) (r) (a) Q_ R_
	G76 X_ Z_ P_ Q_ F_

M00 – Programme stop
M02 – Program end and halts program execution
M03 – Spindle rotation clockwise
M04 – Spindle rotation anti-clockwise
M05 – Spindle stop
M06 – Tool change
M08 – Coolant on
M09 – Coolant off
M30 - Program Stop and Rewind.
M98 – Sub program calling
M99 – Sub program end