Roll Number: _____

Thapar Institute of Engineering & Technology, Patiala
Department of Mechanical Engineering
Mid Semester Examination
March, 2019

BE- 4th Semester
Time: 02 Hours; MM: 50
Date: 09/03/2019

UTA002: Manufacturing Processes
Name of Faculty: ***VJ, DG, DM, RSJ, RTK, DWR,SKS, KPKC, ATS***

NOTE:
All questions are compulsory; assume suitable missing data, if any.
Mention your group number on the top of answer sheet.
Support your answers with neat sketches wherever required.
Use Handout for Q3 (a).

		Mark
Q1 (a)	A steel rod has been turned by using a single point cutting tool at a given specified cutting speed and other working conditions. Determine percentage change in cutting speed required to give 20% reduction in tool life for the as given conditions. Take n = 0.2.	7
(b)	Identify the process as shown schematically in the Fig. 1 (a) and (b) and also explain the major differences between them.	4

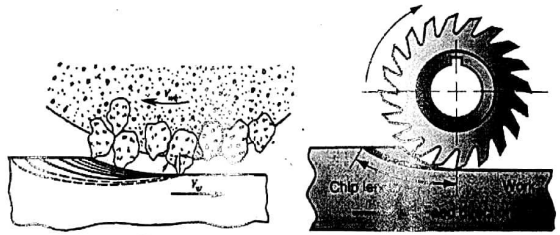


Fig. 1

(c)	A 150 mm long and 12 mm diameter stainless steel rod is to be reduced to 10 mm by turning on a lathe in two passes. The spindle rotates at 500 rpm, and the tool is traveling at an axial speed of 200 mm/min. Calculate the cutting speed (m/min), material removal rate (m^3/min) for each pass and total time required in minute for machining the steel rod.	4
Q2 (a)	A plate of carbon steel AISI 1020 of size 40 mm x 240 mm x 1000 mm (t x w x l) is needed to be rolled to a plate of thickness 30 mm in single cold rolling step. Diameter of the rollers used for the process is 650 mm and rotation speed of rollers is 10 rpm. Determine (a) Is it possible to make plate in single step, if the coefficient of friction between rollers is 0.18, justify your answer? (b) What will the final length of plate if the plate widens by 4%? (c) exit velocity and (d) forward slip, if entrance speed is 18 m/min.	8
(b)	State the main functions of rotating rolls in rolling operation.	2
(c)	Draw and differentiate between conventional milling and climb milling operations in reference to chip-configuration, cutting forces required and surface finish obtained.	2+3
Q3 (a)	Write a CNC part program for the component as shown in the Fig. 2.	10

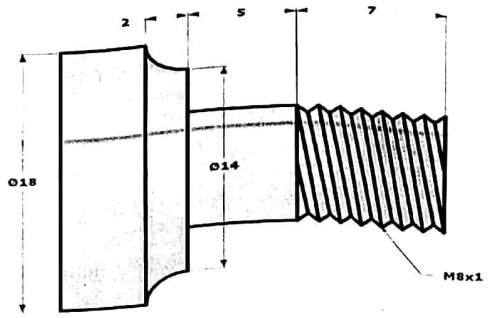


Fig. 2

Turning Operation Parameters-
Spindle Speed for Rough Cut = 2000 rpm clockwise, Feed Rate for Rough Cut = 80 mm/min, Depth of Rough Cut Turning = 1 mm
Tool Retract = 0.5 mm
Material for finishing to be left on all faces = 0.4 mm, Material for finishing to be left on all diameters = 0.3 mm, Spindle Speed for Finish Cut = 2300 rpm clockwise, Feed Rate for Finish Cut = 60 mm/min

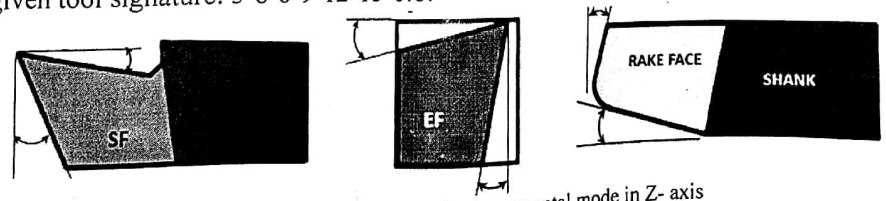
Threading Operation Parameters-
Number of finishing cuts = 2;
Relief angle = 0
Angle of the thread = 60;

Minimum cut depth for rough cut = 0.05 mm
Depth of the final pass = 0.06 mm;

First pass depth of cut = 0.15 mm
Spindle speed during threading = 500 rpm clockwise

(b) What type of chips are you expecting while machining cast iron at low cutting speed? Draw a schematic for such chips and state two advantages for these types of chip. 5

(c) Label and show the Tool angle on given figures of a single point cutting tool w.r.t. given tool signature: 5-8-6-9-12-15-0.8. 5



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 (in mm)
G28 U_ W_ – Go to machine home position in incremental mode
G98 – Feed in mm/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_
G70 P_ Q_ F_ – Finishing cycle
Multiple 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