Kafrelsheikh University
Faculty of Engineering
Department of Mech. Eng.
1st year Mechanical Eng.
Dr. Ibrahem Maher

17 March 2021
Time allowed: 3 hours.
Full Mark: 75
Final exam
MDP1105

Production Engineering (1)

Question 1 **(24 Marks)**

a) Using block diagram, show the general classification of the machining processes.

b) Using diagrams, show the main types of erosion machining processes.

c) Draw a block diagram to show the main variables of a machining process?

d) Draw a block diagram to show the classification of tool materials.

e) Draw the following tool angle signature (7 16 6 8 18 16 1/8).

f) Explain the advantages of coated carbides over uncoated carbides. Name any three materials used for coatings.

g) Explain the deference between orthogonal and oblique cutting.

h) Show diagrammatically the main parts and angles of a finish reamer.

Question 2 **(16 Marks)**

a) It is required to face a disk of 450 mm outer diameter with a central hole of 150 mm using a lath machine. The spindle speed is 50 rpm, feed rate is 0.3 mm/rev, and the depth of cut is 2.5 mm. calculate the machining time.

b) During machining a steel workpiece on the shaper machine using a quick return ratio of 3:2 with a workpiece of 200 mm in length and a cutting speed of 18 m/min, calculate the number of strokes/min.

c) A component is to be machined on the horizontal milling machine with a slab-milling cutter of 100 mm diameter. The cutter has 16 teeth, cutting speed is 100 m/min, and the feed per tooth is 0.025 mm. Calculate

- The rate of work feed in mm/min
- The machining time for one travel if the part length is 500 mm

d) A 300 mm wide strip 25 mm thick is fed through a rolling mill with two powered rolls each of radius = 250 mm. the work thickness is to be reduced to 22 mm in one pass at a roll speed of 50 rpm. The work material has a flow curve defined by K = 275 MPa, n = 0.15, and the coefficient of friction between the rolls and the work is 0.12. Calculate the roll force, torque, and horsepower.

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Question 3 Mark true (T) or false (F) by shading a circle **(20 Marks)**

No.	Statement	T	F
1	The primary motion in turning operation is the linear motion of the tool	O	O
2	Up milling produces better surfaces than down milling.	O	O
3	In planer machines, the tool reciprocates while the workpiece is fixed.	O	O
4	Milling machines are more productive than mechanical shapers.	O	O
5	Up milling is preferred if the horizontal milling machine is sufficiently rigid.	O	O
6	The feed movement of the shaper machine is performed at the end of the return stroke.	O	O
7	Ceramic tools are used on planers to produce the best surface finish.	O	O
8	Shaper machine used for small workpiece but for large workpiece, planer is used.	O	O
9	Milling machine used single point cutting tools.	O	O
10	In milling process, the main cutting motion carried out by the table.	O	O
11	Grinding can be followed by milling operation.	O	O
12	Grinding-wheel grade represents the hardness of the abrasive grains.	O	O
13	High volume to area ratio is typical of the starting work geometry in sheet metal processes	O	O
14	The flow curve expresses the behavior of a metal in plastic region of the stress–strain curve	O	O
15	Flash in impression-die forging serves no useful purpose and is undesirable because it must be trimmed from the part after forming	O	O
16	The production of tubing is possible in indirect extrusion but not in direct extrusion	O	O
17	Hot forging requires less forces than cold forging	O	O
18	The forces used for direct extrusion is larger than indirect extrusion	O	O
19	Free forging produces more accurate parts than die forging	O	O
20	The work is pulled through the die in extrusion process	O	O

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Question 4 Chose the correct answer (Only one correct answer) **(15 Marks)**

No.	Statement	A	B	C	D
1	**Which of the following are bulk deformation processes?** A Bending C Deep drawing B Extrusion D Shearing	O	O	O	O
2	**Which of the following are advantages and characteristics of hot working relative to cold working?** A less overall energy is required C Friction is reduced B strain-rate sensitivity is reduced D increased strength properties	O	O	O	O
3	**The maximum possible draft in a rolling operation depends on which of the following parameters?** A roll diameter C roll velocity B stock thickness D strain	O	O	O	O
4	**Which of the following rolling mill types are associated with relatively small diameter rolls in contact with the work?** A continuous rolling mill C three-high configuration B reversing mill D four-high mill	O	O	O	O
5	**Production of pipes and tubes is associated with which of the following bulk deformation processes** A hobbing C ring rolling B roll forging D tube sinking	O	O	O	O
6	**Increasing strain rate tends to have which one of the following effects on flow stress during hot forming of metal** A decreases flow stress C has no effect B increases flow stress D	O	O	O	O
7	**The average flow stress is the flow stress multiplied by which of the following factors** A n C 1/n B 1+n D 1/(1+n)	O	O	O	O
8	**Hot working of metals refers to which one of the following temperature regions relative to the melting point of the given metal on an absolute temperature scale** A room temperature C 0.4Tm B 0.2Tm D >0.5Tm	O	O	O	O
9	**The coefficient of friction between the part and the tool in cold working relative to hot working tends to be** A higher C no different B lower D	O	O	O	O

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No.	Statement				A	B	C	D
10	Theoretically, the maximum reduction possible in a wire drawing operation, under the assumptions of a perfectly plastic metal, no friction, and no redundant work, is which of the following				O	O	O	O
	A	0.632	C	2.72				
	B	1	D	Zero				
11	Johnson's (εx = a + b ln rx) formula is associated with which one of the following deformation processes				O	O	O	O
	A	bar and wire drawing	C	forging				
	B	extrusion	D	rolling				
12	During a forming operation, the strength coefficient = 550 MPa, strain hardening exponent = 0.22, and the final true strain = 0.85. Determine the average flow stress that the metal experienced during the operation.				O	O	O	O
	A	531	C	435				
	B	561	D	335				
13	Determine the value of the strain-hardening exponent for a metal that will cause the average flow stress to be 3/4 of the final flow stress after deformation.				O	O	O	O
	A	0.22	C	0.44				
	B	0.33	D	0.55				
14	The basic deference between the bar drawing and wire drawing is				O	O	O	O
	A	Workpiece length	C	Workpiece shape				
	B	Workpiece material	D	Workpiece size				
15	The defects in extruded products are				O	O	O	O
	A	Centerburst	C	Surface cracking				
	B	piping	D	All of them				