CLASS: BTECH   SEMESTER: V
BRANCH: PROD   SESSION: MO/2022

SUBJECT: PE301 MANUFACTURING PROCESSES II
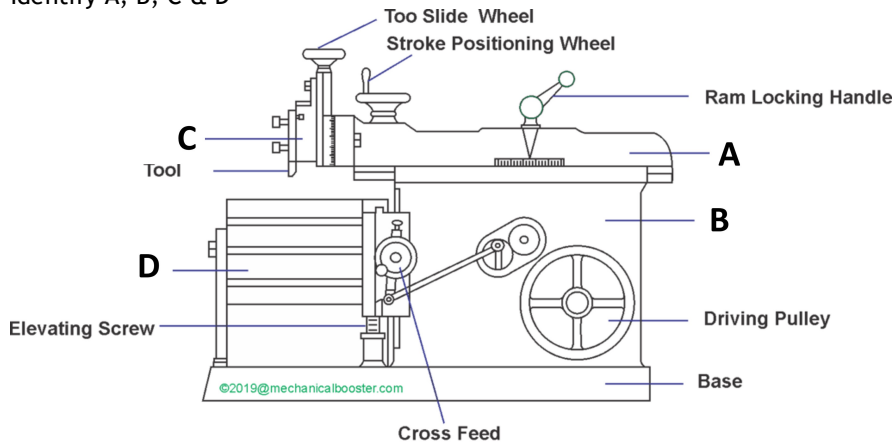TIME: 03 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. ~~Tables/Data handbook/~~ Graph paper ~~etc., if applicable~~, will be supplied to the candidates

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Q.1(a) When do you prefer machining over other manufacturing processes?   [2]
Q.1(b) Describe in words what the Merchant equation tells us. Also, explain why Merchant's theory does   [3]
        not give an accurate estimate of the shear angle.
Q.1(c) A shaft of diameter 50 mm is reduced to 48 mm in one pass by orthogonal turning. The axial feed   [5]
        provided is 2 mm/rev. The rake angle of the tool used is (-10) degrees. The spindle speed is 450
        RPM. The mean length of the chip is 140 mm/rev. The shear strength of the material is 440 N/mm^2.
        Find
        (i) Velocity along shear plane
        (ii) Resultant cutting force if vertical and horizontal components are numerically equal.

Q.2(a) During the machining of a ductile material with an HSS tool, discontinuous chips forms. Suggest   [2]
        what changes you would recommend to get continuous chips during the same cutting operation.
Q.2(b) Discuss in short how threads can be cut on a job in a lathe machine.   [3]
Q.2(c) The following flank wear data were collected in a series of machining tests using C6 carbide tools   [5]
        on 1045 steel (HB=192). The feed rate was 0.375 mm/rev, and the width of the cut was 0.75 mm.
        a) Plot flank wear as a function of cutting time. Using a 0.375mm wear land as the criterion of tool
        failure, determine the lives for the two cutting speeds. (b) Plot the life for a 0.375 mm wear land
        as a function of speed on a plot and determine the values of n and C in the Taylor tool life
        equation. (Assume a straight-line relationship.) (c) Using these results, calculate the tool life for a
        cutting speed of 1.50 m/s.

Cutting speed	Cutting time	Flank wear
V , m/s	min	mm
2	0.5	0.035
	2	0.0575
	4	0.075
	8	0.1375
	16	0.205
	24	0.28
	54	0.375
3	0.5	0.045
	2	0.0875
	4	0.15
	8	0.25
	13	0.3625
	14	0.4
4	0.5	0.125
	2	0.25
	4	0.35
	5	0.4
5	0.5	0.25
	1	0.325
	1.8	0.375
	2	0.4

Q.3(a)   Identify A, B, C & D   [2]

Too Slide Wheel
Stroke Positioning Wheel
Ram Locking Handle
C
A
Tool
B
D
Elevating Screw
Driving Pulley
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Base
Cross Feed
Shaper Machine

Q.3(b)   Distinguish between the shaper machine and the planer machine.   [3]
Q.3(c)   With a neat diagram discuss the twist drill nomenclature.   [5]

Q.4(a)   Name different types of milling cutters.   [2]
Q.4(b)   Define (i) slab milling (ii) straddle milling (iii) gang milling   [3]
Q.4(c)   Find the change gears required and the index movement in order to Index 241 divisions by   [5]
          differential indexing. Differential index head is furnished with change gears as follows: 24, 24, 28,
          32, 40, 44, 48, 56, 64, 72, 86, 100. Use B & S plates.

Brown and sharpe index plates	Hole circles
Plate number 1	15, 16, 17, 18, 19, 20
Plate number 2	21, 23, 27, 29, 31, 33
Plate number 3	37, 39, 41, 43, 47, 49

Q.5(a)   Enumerate at least four points in favour of non-conventional machining processes.   [2]
Q.5(b)   Differentiate between ECM and EDM?   [3]
Q.5(c)   With a neat figure explain the USM process. State its limitations also.   [5]

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