

**PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING**

Final Examination : Semester 1

Academic year : 2006

Date : October 7, 2006.

Time : 9.00-12.00

Subject : 226-314 Machine Tools Technology

Room : A 205

ทฤษฎีในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น

และพักการเรียน 1 ภาคการศึกษา

Instruction :

- Answer all questions in the answer book.
- All notes, books and calculators are not allowed.
- Total score is 100 (50%).

Questions:

1. List and discuss the fundamental differences in structure between a bed type milling machine and a column and knee type of milling machine. (3 marks)
2. What is the knee on a milling machine? What is its purpose? (2 marks)
3. How does a universal dividing head differ from a plain dividing head? (2 marks)
4. What is the purpose of the sector arms on a universal dividing head? (2 marks)
5. What is the purpose of an interlocking cutter? (2 marks)
6. Describe the difference between a two-flute center-cutting end mill and a four-flute center-relieved (gashed) end mill. (2 marks)

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7. Explain the squaring of a block of steel on a milling machine. (4 marks)
8. Given a shaft 3 in. in diameter with a 0.4-in. square key, find:
(a) the depth of the keyway in the shaft; (b) the depth of the keyway in the bore; (c) the distance from the depth of the keyway in the shaft to the opposite side of the shaft; (d) the distance from the bottom of the keyway in the bore to the opposite side of the bore. ($I = 0.013$ in.) (6 marks)
9. Explain the difference between direct and simple indexing. (3 marks)
10. Find the movement of the index handle when simple-indexing the following, using the Brown and Sharpe index plates: (a) 60; (b) 90; (c) 98; (d) 72; (e) 86. (5 marks)
11. Explain the principle of differential indexing if the gearing is 1: 1 and
(a) the plate rotates in the same direction as the index handle; (b) the plate rotates in the opposite direction from the index handle. (4 marks)
12. Using the method of continued fractions, index $39^{\circ}59'$. Find the movement of the index handle and the error. (4 marks)
13. A spur gear has 48 teeth and measures 2.5 in. in outside diameter. Find:
(1) the diametral pitch; (2) the pitch diameter; (3) the addendum;
(4) the dedendum; (5) clearance; (6) the full depth of the tooth ;
(7) the working depth of the tooth; (8) the root diameter; $(c = 0.157/P)$ (8 marks)
14. What is the diametral pitch of a gear? (2 marks)
15. What are the advantages of helical gears compared with spur gears? (2 marks)
16. What mechanisms are used to drive the spindle of a drill press without loss of vertical motion? (3 marks)
- Sapir*
26. Explain the principle of through feed on a centerless grinder. (3 marks)

17. (a) Describe the action of a gun drill. (b) What is the characteristic of a gun drill which makes it possible to drill a straight hole? (4 marks)
18. How does the counterbore operation differ from the spot-facing operation? (2 marks)
19. Describe the lead threads on a starting tap, a plug tap, and a bottoming tap. (3 marks)
20. Make a drawing of a shaper toolslide head and label all parts. (4 marks)
21. The tool slide may be used to make angle cuts. Explain. (4 marks)
22. Explain and illustrate the method by which the return stroke is caused to move faster than the cutting stroke. (4 marks)
23. Given a 60° female dovetail with a 4-in. dimension over the sharp corners at the greatest width and a depth of 1 in., find: (a) the dimensions across the corners at the small width of the dovetail; (b) the best wire size; (c) the measurement over the wires for the female dovetail; (d) the measurement over the wires for the male dovetail.
($w = d/(1 + \cos \theta)$) (6 marks)
24. Describe the two methods used to hitch feed the grinding wheel across the surface of the work on a surface grinder. (2 marks)
25. There are two types of magnetic chucks used on a surface grinder. Make a sketch of the essential parts of these chucks, and illustrate how they are capable of holding a piece of steel. (4 marks)
26. Explain the principle of through feed on a centerless grinder. (3 marks)

Spam

27. Explain the principle and describe the method used to crush-dress a grinding wheel. (3 marks)
28. What are the five factors used to describe a grinding wheel? What function does each of the five factors perform during the grinding operation? (5 marks)
29. Under what conditions should a coarse-grit grinding wheel be used? A fine-grit grinding wheel? (2 marks)

Pichit Pitsuwan
September, 2006.

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