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

ทุจริตในการสอบ 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)

Spor

- 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°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)



26. Explain the principle of through feed on a centerless grinder.

(3 marks)

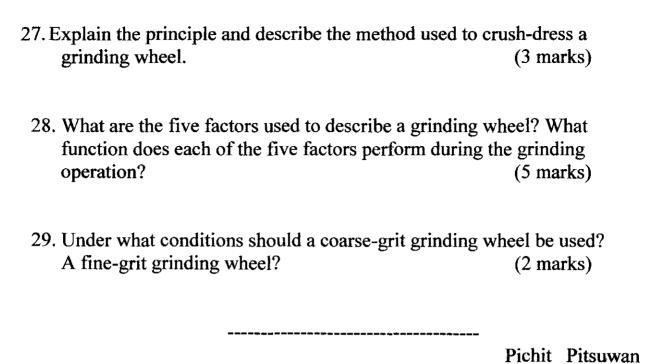
- 17. (a) Describe the action of a gun drill. (b) What is the characteristic of a gun drill which makes it possible to drill a straight hole? (4 marks)
- 18. How does the counterbore operation differ from the spot-facing operation? (2 marks)
- 19. Describe the lead threads on a starting tap, a plug tap, 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 θ))
 (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)

Spir

September, 2006.



Sipila