

Student name : Code : Section :



PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination : Semester 1

Academic Year : 2011

Date : 31 July 2011

Time : 13.30-16.30

Subject : 226-341 Maintenance Engineering

Room : **S817**

คำสั่ง

1. ข้อสอบมีทั้งหมด 12 หน้า (นับให้ครบก่อนลงมือทำ)
2. ห้ามการหยิบยืมสิ่งใด ๆ ทั้งสิ้น จากผู้อื่น ๆ เว้นแต่ผู้คุมสอบจะหยิบยืมให้
3. ห้ามนำส่วนใดส่วนหนึ่งของข้อสอบออกจากห้องสอบ
4. ผู้ที่ประสงค์จะออกจากห้องสอบก่อนหมดเวลาสอบ แต่ต้องไม่น้อยกว่า 30 นาที
ให้ยกมือขออนุญาตจากผู้คุมสอบก่อนจะลุกจากที่นั่ง
5. ผู้ที่ปฏิบัติเข้าข่ายทุจริตในการสอบ ตามประกาศคณะวิศวกรรมศาสตร์ **มีโทษ คือ ปรับตกในรายวิชาที่
ทุจริต และพักการเรียน 1 ภาคการศึกษา**
6. ให้ทำในกระดาษคำตอบเท่านั้น ตอบนอกกระดาษ คำตอบไม่มีคะแนน
7. เขียน ชื่อ **หรือรหัส** ในกระดาษคำตอบทุกหน้าก่อนเริ่มทำ เพื่อป้องกันความสับสน ในกรณีกระดาษคำตอบหลุด
จากฉบับ
8. ให้นักศึกษาสามารถนำสิ่งต่อไปนี้เข้าห้องสอบได้
 ตำรา หนังสือ
 กระดาษ A4 **ได้ 1 แผ่น** (เขียนด้วยลายมือตนเอง และให้ส่งมาพร้อมข้อสอบ)
 นำ Dictionary และ เครื่องคิดเลข เข้าห้องสอบได้ (ห้ามบันทึกข้อมูลที่เกี่ยวข้องกับวิชานี้)
9. ให้ทำข้อสอบโดยใช้ ดินสอ ปากกา

Part #	1	2	3	4	Total
Full score	10	15	20	45	90
Score					

ผู้ออกข้อสอบ ผศ.ดร.กลางเดือน โพนนา

Student name :code :

Part 1 Answer all questions. Please determine whether these following sentences are correct or incorrect. One point (1 point) will be given for the right answer. Minus half point (-0.5 point) will be given for the wrong answer. (Total 10 points)

Q no.	Correct ✓	Incorrect ✗	Question
1			Nuts and bolts should be classified in maintenance material group B.
2			TPM was originally found in Japan.
3			Jishu kaizen is the continuous process that involves with the operator of a machine that usually have frequent breakdown.
4			The TPM kick off step should be done in the first phase of TPM implementation
5			The Quality maintenance involved the quality of maintenance man and method on order to maintain the availability of equipment.
6			Function test is one of the activity in preventive maintenance.
7			The design of a machine is not included in preventive maintenance activity.
8			Time based maintenance is sometimes called "Predictive maintenance".
9			Machine diagnosis technology is the technique that is used in the condition based maintenance.
10			The operator is normally responsible for maintenance prevention activity.

Name :code.....

Part 2 : Select the best words in the below table to answer the following questions. Fill the answers with the given codes (letter and number). Each answer can be used more than once. (15 points)

Code	A	B	C	D	E	G
1	PDCA	PQCDSMEE	Know-how	Clip	CBM	Disconnect
2	MP	Autonomous maintenance	EOQ	2-bins	OEE	APQ
3	Toyota	Mechanical spare part	Purchase request slip	Daily inspection slip	Periodical inspection slip	Centralization
4	Honda	Confidentiality	permanent store	Nippon denso	Non-permanent store	Spare part Purchasing
5	PBM	Machine tools	JIT	8 pillars	Part list	12 steps

No.	Questions	Answer Code	
		Letter	Number
E x.	<i>The maintenance that is done by the operator of a machine.</i>	A	2
1	After the operators of the production department finished their PM work, what kind of slip should they finish?		
2	The material that should be controlled by 2-bins method.		
3	The material that is life-predictable and has frequent amount of use should be kept in		
4	After the maintenance man finished their PM work, what kind of slip should they finish?		
5	The first company that introduced TPM.		
6	Maintenance carried out in response to a signification in a machine as indicated by a change in a monitored parameter of machine condition.		
7	The expensive material that is life-unpredictable and has small downtime loss should be kept in		
8	The inventory control method that is normally used for controlling maintenance material that is purchased in a bulk is		

Name :code.....

No.	Questions	Answer Code	
		Letter	Number
9	The inexpensive material that is life-unpredictable should be kept in		
10 is one of the fixed size ordering system.		
11	What kind of information that should be included in the machine manual?		
12	The work that is not directly involved maintenance function but it supports maintenance management.		
13	The factory that works with contract maintenance may be faced problem with		
14	Before any maintenance or cleaning is carried out the operator must the appliance from the electricity supply.		
15	One of the benefit of contract maintenance is to gain for the contractor.		

Student name :code :

Part 3 . Select optimum answers and answer in the answer sheet only. ใช้

เครื่องหมายกากบาท (20 points)

Q	Answer			
1	a	b	c	d
2	a	b	c	d
3	a	b	c	d
4	a	b	c	d
5	a	b	c	d
6	a	b	c	d
7	a	b	c	d
8	a	b	c	d
9	a	b	c	d
10	a	b	c	d
11	a	b	c	d
12	a	b	c	d
13	a	b	c	d
14	a	b	c	d
15	a	b	c	d
16	a	b	c	d
17	a	b	c	d
18	a	b	c	d
19	a	b	c	d
20	a	b	c	d

Questions

1. Which type of maintenance material should be controlled by 2-bins method?
 - a. Tools box
 - b. Lubrication grease
 - c. Pivot
 - d. Screw Driver
2. Which group of maintenance material is included "adjustable spanner"?
 - a. Mechanical spare part
 - b. Electrical spare part
 - c. Machine tools
 - d. Disposal material
3. Which group of maintenance material is included "transformer"?
 - a. Mechanical spare part
 - b. Electrical spare part
 - c. Machine tools
 - d. Disposal material
4. Which group of maintenance material is included "lock washer"?
 - a. Mechanical spare part
 - b. Electrical spare part
 - c. Machine tools
 - d. Disposal material
5. Which type of maintenance organization is suited to be applied for the case where the equipment for plural products series exists in the large-scale plant?
 - a. Area type
 - b. Compromised type
 - c. Centralized type
 - d. No correct answer
6. Which type of maintenance organization is suitable for the small

Student name :code :

- organization with a few maintenance men?
- Compromised type
 - Area type
 - Centralized type
 - No correct answer
7. Which answer is not included in a target of production management?
- Delivery
 - Moral
 - Man
 - Environment
8. Which type of maintenance material should NOT be controlled by 2-bins method?
- Bolt
 - Metal washer
 - Rubber ring
 - Shaft
9. Which answer is not a characteristic of machine in the past?
- Easy for use and maintain
 - Comprise mainly of mechanical parts
 - Normally large in size
 - Fully continuous machine
10. Which answer is NOT an advantage of decentralized maintenance organization?
- Fast access of maintenance man
 - Maintenance man has good relationship with machine operator
 - Maintenance man has more free time
 - High skill of maintenance man
11. What are NOT the advantages of coding of maintenance information and data?
- maintenance man can easily ignore maintenance data
 - shorter time for data entry
 - data summary can be done easily
 - the size of slips becomes small.
12. What is the disadvantage of "departmental type" maintenance organization?
- The delay of maintenance work is often found.
 - Maintenance men have more idle.
 - Maintenance men cannot become specialists.
 - Longer time for maintenance is normally found.
13. The engineering department should be directly responsible for in TPM implementation.
- Self maintenance
 - Initial phase management
 - Preventive maintenance
 - Education and training management
14. Which answer is the meaning of "maintenance"?
- The ability of maintenance technician and engineer which is related to machine system.
 - The recovery of machine to its original performance and enhance its effectiveness thought out its life cycle.
 - All activities that must be done to maintain system and subsystem of a machine and its part to ensure that it is effectively and efficiently performed according to its function.
 - The activities involves cleaning, lubrication, inspection, function test and modification of machine in order to maintain the machine's performance.

Student name :code :

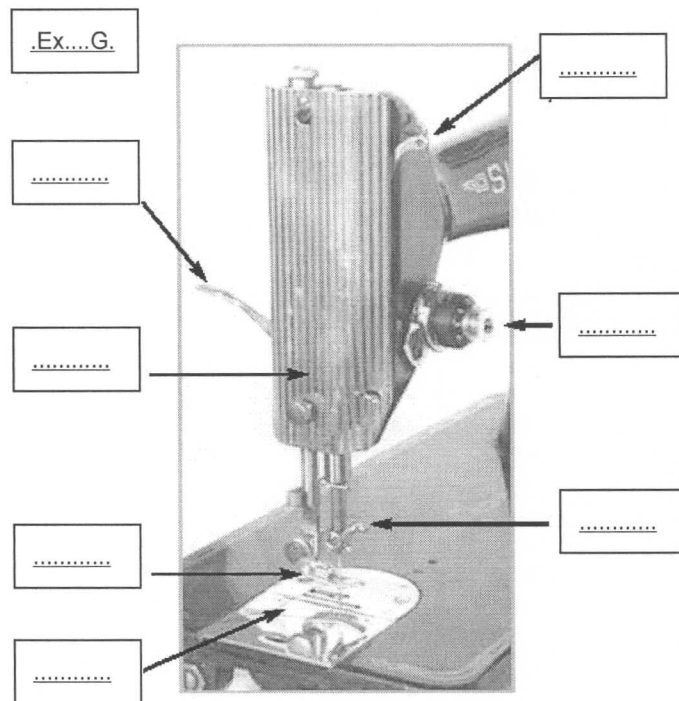
15. Which answer is not the problem due to maintenance system?
- No record of machine problems and maintenance activity.
 - The spare parts are frequently out of stock.
 - The operators in the production department do not participate in maintenance activity.
 - The preventive maintenance activity does not follow PM plan.
16. What type of maintenance material that the amount of its order is depended exactly on the amount of use?
- type A
 - type B
 - type C
 - type D
17. Which management technique that is normally used to support stock management in the maintenance inventory?
- Lean
 - 5S
 - JIT
 - TPM
18. What type of material should be kept separately from the normal maintenance materials?
- Pulley drum
 - Adjustable spanner
 - Bearing
 - Lubrication oil
19. What is the major purpose of partial-delivery method in inventory maintenance management?
- To reduce number of delivery
 - To reduce the maintenance holding cost
 - To reduce maintenance spare part deterioration
 - To reduce number of ordering
20. Which data should be included in the maintenance order slip?
- Name of machine supplier
 - Time for material purchasing
 - Price of fixed machine
 - Countermeasure of the problem of machine

Part 4: Answer these following questions. (45 points)

4.1 What is the benefit of centralized maintenance organization compared to decentralized maintenance organization? (3 points)

4.2 According to sewing manual (as given in LMS), indicate parts of sewing machine by using the given parts in the following list (write only a letter in front of the list). (7 points)

- A. Throat plate
- B. Presser bar
- C. Needle clamping screw
- D. Clamp stop motion screw
- E. Face plate
- F. Presser foot lifter
- G. Tension mechanism
- H. Presser foot
- I. Thread take up lever
- J. Needle bar



Student name :code :

4.3 What is the quality maintenance? Does it differ from the quality of maintenance activity of the organization? (5 points)

4.4 According to your maintenance website the your group was developed, please explain the content of your website in detail and indicate your responsibility. (5 points)



Student name :code :

4.5 The following information is captured from the washing machine manual (as given in LMS), please develop a Thai emergency instruction for Thai operators. (5 points)

Emergency emptying out

If the water is not discharged, proceed as follows to empty out the machine:

- pull out the plug from the power socket;
- close the water tap;
- if necessary, wait until the water has cooled down;
- open the pump door;
- place a bowl on the floor and place the end of the emergency emptying hose into the bowl. Remove its cap. The water should drain by gravity into the bowl. When the bowl is full, put the cap back on the hose. Empty the bowl. Repeat the procedure until water stops flowing out;
- clean the pump if necessary as previously described;
- replace the emergency emptying hose in its seat after having plugged it;
- screw the pump cover again and close the door.

Student name :code :

4.6 The faculty of medicine, Prince of Songkla University, desires to establish maintenance system in the PSU hospital. You are assigned to be a member of the team. Please answer these following questions. All data can be assumed where necessary. (20 points)

1. Design the suitable maintenance organization for the PSU hospital and explain your reason to support your design. (4 points)
2. Draw flow chart of maintenance procedure. (6 points)
3. According to the classification (ABC) of machines due to their importance, please give 5 examples of machine in each class in the PSU hospital. (6 points)
4. Design machine coding system. (4 points)



Student name :code :

GOOD LUCK Asst. Prof. Dr. Klangduen Pochana



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