

Student name :Code :Section :



**PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING**

Final Examination : Semester 2

Academic Year : 2009

Date : 24 Feb 2010

Time : 9.00-12.00

Subject : 225-349 Safety and Environmental Engineering

Room : 5203

คำสั่ง

1. ข้อสอบมีทั้งหมด 4 ข้อ ในกระดาษคำถาม 10.หน้า (นับให้ครบก่อนลงมือทำ)
2. ห้ามการหยิบยื่นสิ่งใด ๆ ทั้งสิ้น จากผู้อื่น ๆ เว้นแต่ผู้คุมสอบจะหยิบยื่นให้
3. ห้ามนำส่วนใดส่วนหนึ่งของข้อสอบออกจากห้องสอบ
4. ผู้ที่ประสงค์จะออกจากห้องสอบก่อนหมดเวลาสอบ **แต่ต้องไม่น้อยกว่า 30 นาที**
ให้ยกมือขออนุญาตจากผู้คุมสอบก่อนจะลุกจากที่นั่ง
5. เมื่อหมดเวลาสอบ ผู้เข้าสอบต้องหยุดการเขียนใด ๆ ทั้งสิ้น
6. ผู้ที่ปฏิบัติเข้าข่ายทุจริตในการสอบ ตามประกาศคณะวิศวกรรมศาสตร์ **มีโทษ คือ ปรับตกในรายวิชาที่
ทุจริต และพักการเรียน 1 ภาคการศึกษา**
7. ให้ทำในกระดาษคำตอบเท่านั้น ตอบนอกกระดาษ คำตอบไม่มีคะแนน
8. เขียน ชื่อ หรือรหัส ในกระดาษคำตอบทุกหน้าก่อนเริ่มทำ เพื่อป้องกันความสับสน ในกรณีกระดาษคำตอบ
หลุดจากฉบับ
9. ให้นักศึกษาสามารถนำสิ่งต่อไปนี้เข้าห้องสอบได้
 ตำรา หนังสือ
 กระดาษ
 นำ Dictionary และ เครื่องคิดเลข เข้าห้องสอบได้
10. ให้ทำข้อสอบโดยใช้ ดินสอ ปากกา

Question#	1	2	3	4	Total
Full score	10	30	30	20	90
Score					

ผู้ออกข้อสอบ ผศ.ดร.กลางเดือน โพนนา

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Question 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. 1.	Correct ✓	Incorrect ✗	Question
1			Boiler rating means fire flow rate that is produced by the boiler.
2			The spray tower or scrubber is used for removal of small gas bubbles or water droplets from the air cooling tower of air condition system.
3			Yellow or green colors are normally used for painting machine guard.
4			The water used for generate steam in boiler should have pH more than 9.
5			The letter on fire extinguisher for example "6A-10B", shows Fire Rating of the fire extinguisher.
6			H ₂ S is the gas that has rotten egg odor at low concentrations, and odorless at high concentrations.
7			Incandescent lamp normally has longer life than Fluorescent lamp.
8			O ₃ is the highly reactive gas which causes damage to vegetation and property.
9			The wall of boiler is normally measured by using ultrasonic testing device
10			The distance between 2 switches of two-hand control machine guard should be more than 30 cm.

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Question 2. Select optimum answers. (30 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
21	a	b	c	d
22	a	b	c	d
23	a	b	c	d
24	a	b	c	d
25	a	b	c	d
26	a	b	c	d
27	a	b	c	d
28	a	b	c	d
29	a	b	c	d
30	a	b	c	d

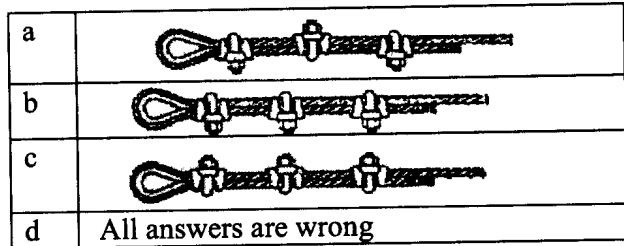
- In working area of 500 m², number of fire extinguisher should not be less than.....
 - 1
 - 3
 - 5
 - 7
- According to Thai regulations, in normal condition of working area (8 hours/day) the noise should not be more than
 - 80 dBA
 - 90 dBA
 - 100 dBA
 - 110 dBA
- Ear plug should be able to reduce noise at least.....
 - 10 dBA
 - 15 dBA
 - 20 dBA
 - 25 dBA
- What is the entrained solid particle formed as a result of incomplete combustion of carbon materials?
 - Fume
 - Smoke
 - Mist
 - Dust
- Ear muff should be able to reduce noise at least.....
 - 10 dBA
 - 15 dBA
 - 20 dBA
 - 25 dBA
- Occupational Safety and Health Administration (OSHA) of USA recommends that worker should not completely work in workplace that has noise more than
 - 120 dBA
 - 130 dBA
 - 140 dBA
 - 150 dBA

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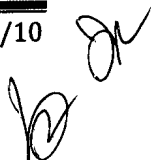
7. The pressure of fire sprinkle should not be less than
 - a) 8 psi
 - b) 9 psi
 - c) 10 psi
 - d) 11 psi
8. Portable fire extinguisher should be installedabove floor level.
 - a) 0.8-1 m
 - b) 1-1.4 m
 - c) 1.2-1.5 m
 - d) 1.3-1.6 m
9. The temperature in workplace should not be more than
 - a) 40 °C
 - b) 45 °C
 - c) 50 °C
 - d) 55 °C
10. The light in walkway of warehouse should not be less than
 - a) 20 Lux
 - b) 30 Lux
 - c) 40 Lux
 - d) 50 Lux
11. What is the liquid particle that is formed by the condensation of vapors and perhaps by chemical reaction?
 - a) Fume
 - b) Smoke
 - c) Mist
 - d) Dust
12. What is the equipment that is possibly the most popular, economical, and effective means of controlling particulates?
 - a) Cyclone
 - b) Bag filter
 - c) Spray tower
 - d) Wet scrubber
13. The solid particle that consists of relatively large particles is called.....
 - a) Fume
 - b) Smoke
 - c) Mist
 - d) Dust
14. According to Interior Acts, fire extinguishing practice should be conducted at least....
 - a) Once per year
 - b) Once per quarter
 - c) Every second month
 - d) Twice per year
15. What is the Industrial Standard used for Occupational Health and Safety?
 - a) ISO9000
 - b) ISO14000
 - c) ISO18000
 - d) ISO22000
16. According to safety laws, workplace area for each worker should not be less than....
 - a) 3 m²
 - b) 4 m²
 - c) 5 m²
 - d) 6 m²
17. What is the liquid particle formed by the atomization of a parent liquid. It settles out under gravity?
 - a) Smoke
 - b) Spray
 - c) Mist
 - d) Dust
18. Which answer is not an element of fire pyramid?
 - a) Oxygen
 - b) Temperature
 - c) Chain reaction
 - d) Wind
19. What type of fire caused by electrical problem?
 - a) A

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- b) B
c) C
d) D
20. According to fire diamond, which color indicates level of flammability?
a) Blue
b) Red
c) Yellow
d) White
21. What type of chemical extinguisher hazards to environment?
a) CO₂
b) BCF
c) Na₂CO₃
d) CFC
22. Which detector is NOT used for fire accident detection and prevention?
a) Flame Detector
b) Heat Detector
c) Fume Detector
d) Smoke Detector
23. Which environment condition of workplace is suitable in Thailand?
a) Temperature 35-45°C
b) Relative Humidity 50-60%
c) Temperature swing 10-15°C
d) Wind speed 1 m/s
24. What is the width of factory pathway that is sufficient for two ways transportation with 4 wheels vehicle?
a) Two times of vehicle width.
b) Two times of vehicle width plus 20 inches.
c) Two times of vehicle width plus 36 inches.
d) Three times of vehicle width.
25. Which angle is suitable design for permanent ladder?
a) 20-25°
b) 20-30°
c) 25-35°
d) 30-35°
26. In a factory, the forklift driver should not drive faster than
a) 15 km/hr
b) 20 km/hr
c) 25 km/hr
d) 30 km/hr
27. What type of lamp is normally used for external pathway?
a) Incandescent lamp
b) Fluorescent lamp
c) Mercury or sodium lamp
d) No correct answer
28. Which picture is a correct method of using grip?



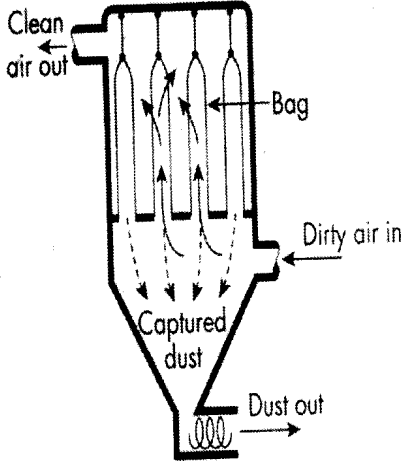
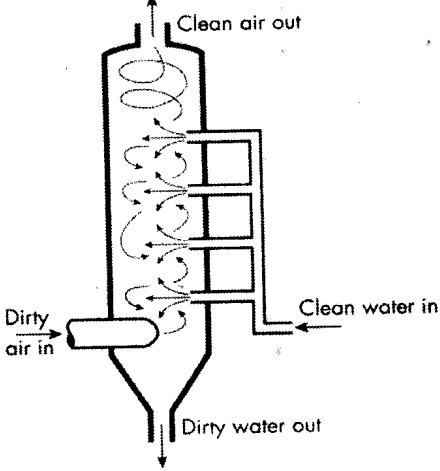
29. Which factor does not affect electrical hazard severity?
a) Contact time
b) Electric current
c) Electric frequency
d) Temperature
30. What type of machine guard is normally used for press machine?
a) Two-hand control
b) Remote control
c) Electric eye
d) Sweep device



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Question 3 : Answer these following questions (30 points)

1. Explain the function and mechanism of these following equipments. (10 points)

 <p>Clean air out</p> <p>Dirty air in</p> <p>Bag</p> <p>Captured dust</p> <p>Dust out</p>	 <p>Clean air out</p> <p>Dirty air in</p> <p>Clean water in</p> <p>Dirty water out</p>
<p>Equipment A</p>	<p>Equipment B</p>



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2. In a feed mill factory, there are 3 machines (with SPL 95,93, and 99 dBA) located in the same room. Please calculate total dBA of this room. Show your calculation. (5 points)

3. In a furniture factory, a worker works near press machine with 90 dBA for 3 hours, lathe machine with 93 dBA for 2 hours and grinding machine with 96 dBA for 1 hour. Please calculate TWAN (Time-Weighted Average Noise). Show your calculation. (5 points)

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4. According to your presentation and assignment about accident and first aid, please answer these following questions: (10 points)

4.1 What is the topic that you have chosen?

4.2 What is the first aid method of that accident?

4.3 What is your recommendation of that accident?

4.4 From your presentation, what are the questions of your friends that posted in LMS?



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News # 2 : Unguarded machine removed man's fingers

Schulman Inc. Ltd of Crumlin, Monmouth, has been prosecuted and fined over machine guarding failures that permitted an industrial accident in which an employee lost 3 fingers as he cleaned a bagging machine probe. In October last year, the employee accessed a moving part of the machine that was inadequately guarded, additionally he worked without the benefit of a clear procedure for cleaning and maintenance. The company was fined a total of £18,000 with costs of £3,827. (1st October 2009).

1. How did the employee lose his fingers?
2. What is the principle of machine guard design which is used to protect an unintentional access of employee to a moving part of machine?
3. Apart from using machine guard, how can we prevent this type of accident?

GOOD LUCK Asst. Prof. Dr. Klangduen Pochana 