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| Name | 1D Code |

PRINCE OF SONGKLA UNIVERSITY FACULTY OF ENGINEERING

Midterm Examination Semester II Academic Year: 2006

Date: 23 December 2006 Time: 9.00-12.00 am

Subject: 228-514 Environmental Management Room: Room: Room:

<u>คำสั่ง</u>

นำเอกสารเข้าห้องสอบได้

- นำ Dictionary และ เครื่องคิดเลข เข้าห้องสอบได้

ใช้ดินสอได้ แต่ต้องเขียนให้อ่านได้ชัดเจน

- ให้ทำในกระคาษคำตอบเท่านั้น ตอบนอกกระคาษ คำตอบไม่มีคะแนน

 ข้อสอบมีทั้งหมด 6 หน้า ให้เขียน ชื่อ <u>และ</u> รหัส ในกระคาษคำตอบทุกหน้าก่อนเริ่มทำ เพื่อ ป้องกันความสับสน ในกรณีกระคาษคำตอบหลุดจากฉบับ

ทุจริตในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภากการศึกษา และปรับตกในรายวิชาที่ทุจริต

Score

| Problem | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|------------|----|----|----|----|---|----|----|----|---|----|-------|
| Full score | 10 | 15 | 10 | 10 | 5 | 10 | 10 | 15 | 5 | 10 | 100 |
| Your score | | | | | | | | | | | |

อ.สุเมธ ใชยประพัทธ์ (ผู้ออกข้อสอบ)

| 1. | What is "Eutrophication problem"? What is the cause of this problem? How does eutrophication affect the DO in water? (10 pts.) |
|-------------|--|
| | |
| | |
| | |
| 2. | The items listed below are the components in standard wastewater treatment system. |
| | Describe what it is and the concept how it works: |
| Pri | mary Sedimentation Tank (3 pts.) |
| Dis | solved Air Flotation (3 pts.) |
| <u>Eq</u> ı | ualization Basin (3 pts.) |
| <u>Re</u> 1 | rumed Sludge (3 pts.) |
| <u>Ae</u> | ration Tank (3 pts.) |

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3. Give the full names of BOD, COD, and SS and explain each parameter (6 pts). What is the difference between BOD and COD (2 pts.). What are the standard values (Effluent Standard) of these 3 parameters for industrial discharge of Thailand (2 pts.)?

4. Nuclear energy seems to be a good alternative for the future. In comparison to the other kinds of energy, give 3 good things and 3 bad things about this kind of energy. (10 pts.)

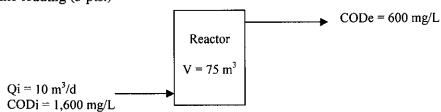
5. Describe the 2 forms (species) of ammonia, and the dynamics of them in water as a function of pH. (5 pts.)

6. Wastewater reuse can be done both in industrial factory and in agriculture. Give 3 negative effects of wastewater reuse in industry and also 3 negative effects on agriculture. (10 pts.)

7. Imagine that you are visiting an industrial plant that produces a very high strength wastewater (high BOD) such as palm oil mill, which uses anaerobic treatment system. The operator of its wastewater treatment system told you that the biogas production from his system is reduced in the past 3 days. He thinks that the system is failing. Could you explain to him the logical cause (or reason) of such symptom? (10 pts.)

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- 8. A wastewater treatment system shown below is treating the wastewater of a COD 1,600 mg/L at a flow rate 10 cubic meters per day. Size of the reactor (system) is 75 cubic meters and the effluent of the system has COD 600 mg/L. Answer the followings;
 - a. Hydraulic retention time of the system (5 pts.)
 - b. Removal efficiency (5 pts.)
 - c. Organic loading (5 pts.)



9. What is productivity? And how can you increase productivity and save the environment at the same time? (5 pts.)

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10. In the same factory as in problem 8, after the system fails, the operator thinks that the company should build a new treatment system. The problem is that he does not know what the COD of the total wastewater is. So he needs to collect a composite sample, which he will collect a certain amount of wastewater flowing pass the flow meter every 4 hours. So, each time he collects 1 liter of wastewater sample and record the flow. Results below are his data.

| Sample No. | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------|-----------|-----------|------------|-------------|-------------|-------------|
| Time | 0.00-4.00 | 4.00-8.00 | 8.00-12.00 | 12.00-16.00 | 16.00-20.00 | 20.00-24.00 |
| Flow rate (m³/hr) | 20 | 40 | 80 | 80 | 60 | 0 |

From the results, how much (volume) of each sample he needs to mix together to get a composite sample? (10 pts.)