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## EIGHTH SEMESTER

**B.E. (ENE)**

**MID SEM EXAMINATION**

**March**

**2006**

### **ENE-411 FIRE HAZARDS AND SAFETY CONTROL SYSTEMS**

*Time: 1 Hour 30 Minutes*

*Max. Marks : 20*

**Note :** Answer any **FIVE** questions.

- 1 Describe the factors affecting time to flash over. Discuss the significance of this time in fire fighting. 4
- 2 Describe the lines of defence & the measures taken against arson attack on buildings. 4
- 3 Describe all the components of an effective fire communication system. 4
- 4 Describe the significance, classification and constraints faced by various fire test. Also, list the risks which these tests are designed to assess. 4
- 5 Describe in detail the fire hazard properties of materials. 4
- 6 Discuss & describe the objectives of various tactics used in fire safety engineering. 4

# Values for Error function ( $x$ ) and Complementary Error function

$x$	$\text{erf}(x)$	$\text{erfc}(x)$
-3.0	-1.000	2.000
-2.9	-1.000	2.000
-2.8	-1.000	2.000
-2.7	-1.000	2.000
-2.6	-1.000	2.000
-2.5	-1.000	2.000
-2.4	-0.999	1.999
-2.3	-0.999	1.999
-2.2	-0.998	1.998
-2.1	-0.997	1.997
-2.0	-0.995	1.995
-1.9	-0.993	1.993
-1.8	-0.989	1.989
-1.7	-0.984	1.984
-1.6	-0.976	1.976
-1.5	-0.966	1.966
-1.4	-0.952	1.952
-1.3	-0.934	1.934
-1.2	-0.910	1.910
-1.1	-0.880	1.880
-1.0	-0.843	1.843
-0.9	-0.797	1.797
-0.8	-0.742	1.742
-0.7	-0.678	1.678
-0.6	-0.604	1.604
-0.5	-0.520	1.520
-0.4	-0.428	1.428
-0.3	-0.329	1.329
-0.2	-0.223	1.223
-0.1	-0.112	1.112
0.0	0.000	1.000

$x$	$\text{erf}(x)$	$\text{erfc}(x)$
0.1	0.112	0.888
0.2	0.223	0.777
0.3	0.329	0.671
0.4	0.428	0.572
0.5	0.520	0.480
0.6	0.604	0.396
0.7	0.678	0.322
0.8	0.742	0.258
0.9	0.797	0.203
1.0	0.843	0.157
1.1	0.880	0.120
1.2	0.910	0.090
1.3	0.934	0.066
1.4	0.952	0.048
1.5	0.966	0.034
1.6	0.976	0.024
1.7	0.984	0.016
1.8	0.989	0.011
1.9	0.993	0.007
2.0	0.995	0.005
2.1	0.997	0.003
2.2	0.998	0.002
2.3	0.999	0.001
2.4	0.999	0.001
2.5	1.000	0.000
2.6	1.000	0.000
2.7	1.000	0.000
2.8	1.000	0.000
2.9	1.000	0.000
3.0	1.000	0.000

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## EIGHTH SEMESTER

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### **ENE-412 WATER AND SOIL CONSERVATION ENGG.**

*Time: 1 Hour 30 Minutes*

*Max. Marks : 20*

**Note :** Answer any **THREE** questions from **Part-A** and **TWO** from **Part-B** in the same answer book.

The symbols & notations used here have their usual meaning.

Assume suitable missing data, if any.

#### **PART-A**

- 1[a] What are the various forces involved in soil erosion. Describe the effects manifested by each force.
- [b] Describe the various types of soil erosion caused by water. Also give their comparison (similarities and differences). 5
- 2 Give the typical Indian soil loss values. How can the Universal soil loss equation be used to determine acceptable values for C and /or P for addressing this? Demonstrate & explain in detail the procedure by rearranging the USLE. 5
- 3[a] What is a conceptual model? As part of your answer, sketch a simple box and arrow conceptual model for an environmental process.
- [b] Discuss the theoretical assumptions in the Langmuir adsorption isotherm and describe what an adsorption isotherm shows by providing an illustrative sketch. 5

- 4 Give a brief description of each of the following soil conservation practices. Rank them from highest to lowest with respect to value of P in the USLE.
- [a] Terracing
  - [b] Cultivating Up and Down the slope
  - [c] Contour Farming
  - [d] Strip Cropping.

5

### PART-B

- 5 For an Agra location ( $R = 400 \frac{t-m}{ha} \cdot \frac{mm}{h}$  per year), soil containing 0.5% organic matter was shown to have a K value of 0.27. Estimate gross soil erosion if the site slope length is 30m with an average field slope of 9%. Assume that the plot is planted with guar yielding a C value of 0.42. The practice adopted is that of contour cultivation, yielding a P value of 0.6. Use the following equations for finding L and S

$$L = (L_p / 22.13)^m$$

$$m = \sin \theta / [\sin \theta + 0.269(\sin \theta)^{0.8} + 0.05]$$

$$\theta = \tan^{-1}(\text{field slope} / 100)$$

$$S = 16.8 \sin \theta - 0.05$$

Suggest some reasonable alternative for reducing the calculated value of soil erosion.

2½

- 6 Restate the Langmuir's equation  $y/M = abC / (1+aC)$  using the values for a and b for the following data:

<i>M(PAC mg/l)</i>	<i>Initial conc. of contaminant (mg/l)</i>	<i>(Equilibrium conc. of containment) (mg/l)</i>
2.0	225	60.0
3.5	225	26.7
5.0	225	17.7
6.5	225	15.6
8.0	225	14.0

2½

7

An organic contaminant is spilling at a concentration of 225 mg/l into the ground under continuous (step-input) conditions. Predict the concentration of this contaminant using the one dimensional advection dispersion equation 5 years after the spill started at a well 15 m away from the spill location.

Assume the following conditions

- [a] Soil bulk density = 2.5 g/cc
- [b] ground water velocity = 1.0 m/day
- [c] Log  $K_{ow}$  for contaminant = 3
- [d] Effective porosity of soil = 0.18
- [e] Fraction organic carbon of soil = 0.02
- [f] Half life for decomposition of contaminant = 20 years
- [g] Coeff. Of hydrodynamic dispersivity  $\alpha = 0.1$  and Diffusivity  $D^* = 1 \times 10^{-9} \text{ m}^2/\text{s}$ . Use the following equations to calculate partitioning coefficient :

$$\text{Log } K_{OC} = 0.544 \text{ Log } K_{OW} + 1.377$$

$$K_p = K_{OC} \times f_{OC}$$

The following equation can be used in the model

$$C = C_0 / 2 e^{-kt} (A_r + B_r * C_r)$$

$$\text{Where } A_r = \text{erfc} \left\{ (RL - V_x t) / (2\sqrt{RD_L t}) \right\}$$

$$B_r = \exp. (V_x L / RD_L)$$

$$C_r = \text{erfc} \left\{ (RL + V_x t) / 2\sqrt{RD_L t} \right\}$$

$$D_L = \alpha L V_x + D^*$$

$$R = 1 + \frac{\delta_b K_p}{n}$$

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### **ENE-413 ENVIRONMENTAL IMPACT ASSESSMENT AND AUDIT**

*Time: 1 Hour 30 Minutes*

*Max. Marks : 20*

**Note :** Question No.1 is compulsory.  
Answer any **FIVE** questions from the rest.  
Assume suitable missing data, if any.

- 1 Explain the method of checklist for assessment and reporting of Environmental Impacts along with an example. List various parameters of one such checklist to be used with this method. 5
- 2 Explain what is Environmental Impact Assessment? What are its objectives and benefits. 3
- 3 Explain how the environmental Impacts may be classified by giving examples. 3
- 4 What are environmental indices? How they are used for reporting of environmental Impacts? Explain water quality index of NSF in this regard. 3
- 5 Explain quality of life index. List the parameters alongwith weights for a quality of life index. 3
- 6 Explain how physical environment variables can be measured for EIA study including all the categories of physical environment. 3
- 7 Explain how social and economic variables can be measured for EIA study. 3