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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: M. TECH (HSE+DM)

Subject (Course): Environmental Engineering & Management

Course Code: HSFS7001

No. of page/s:3

Semester –I

Max. Marks : 100

Duration : 3 Hrs

Note:-Attempt all the questions from section A and B and two questions from section C.

Section A (10×2=20 Marks)

1. Select the most appropriate answer (10*1=10 Marks)

- I. What term refers to energy being absorbed by the earth then returned to the atmosphere?
A) reflection B) temperature inversion C) insolation D) radiation
- II. Which of the following descriptions of air temperature from the ground up best depicts the existence of an inversion layer?
A) cool, cooler, cold B) cool, warm, cool C) warm, cool, cooler D) warm, cool, warm
- III. The two most important elements that differentiate weather conditions are:
A) air pressure and precipitation B) air pressure and temperature
C) precipitation and seasonal changes D) temperature and precipitation
- IV. On a clear, cloudless night the radiation process causes:
A) rainfall, and perhaps a severe thunderstorm B) the earth to store more energy
C) humidity to increase D) temperatures to decrease
- V. Which statement is not true about global warming?
 - i. The 20th century was the warmest century since the medieval warm period of 800-1,200 A.D.
 - ii. The rate of glacial melt has accelerated in the past few decades.
 - iii. Scientists now have the tools to predict the local and regional consequences of global warming.
 - iv. Global warming will alter temperature and precipitation patterns.
- VI. Which statement about air pressure is correct?

- i. The greater the differences in air pressure between places, the greater the wind.
 - ii. Air pressure is lowest closer to the earth's surface.
 - iii. High temperatures are associated with high air pressure.
 - iv. If distances between high- and low-pressure zones are short, wind velocities diminish.
- VII. Which of the following is not considered a natural factor in short-term climatic change?
 - A) volcanic eruptions B) Sunspot activity C) earth's orbital shape
 - D) oceanic circulation
- VIII. Which statement is not true about the greenhouse effect?
 - i. The greenhouse effect began with the Industrial Revolution.
 - ii. Carbon dioxide is the primary greenhouse gas.
 - iii. The greenhouse effect slows down reradiation back into space.
 - iv. Deforestation adds to the greenhouse effect.
- IX. High pressure air masses are:
 - A) heavy and warm B) heavy and cold C) light and warm D) atm. taxonomy
- X. Which of the following has not been suggested by scientists as an explanation of long-term climatic change?
 - i. the changing shape of the earth's orbit around the sun
 - ii. the varying tilt of the earth's axis relative to the sun
 - iii. the changing direction of the earth in its revolution around the sun
 - iv. the gyration of the earth's rotation axis
- 2. Fill in the blanks: (5*2=10)
 - I. Unit of environmental productivity is
 - II. Chipko movement which was a forest conservation movement started in year.
 - III. pH of acid rain is to
 - IV. % of water is available for drinking.
 - V. Unit of acidity are& in different unit system.

PART-B (40 Marks): All The questions are mandatory

- 3. Calculate the velocity of flow and discharge in a sewer of circular section having radius of 10 cm laid at a gradient of 1 in 500. Use Manning's formula, take $N=0.012$ and assume that water is running 12 full. (8)
- 4. The Dilution Factor P for an unseeded mixture of waste and water is 0.030. The DO of the mixture is initially 9.0 mg/L, and after five days it has dropped to 4.0 mg/L. The reaction rate constant K has been found to be 0.20 days^{-1} . (8)

- i. What is the five-day BOD of the waste?
 - ii. What would be the ultimate carbonaceous BOD?
 - iii. What would be the remaining Oxygen demand after five days?
5. Gaussian plume model is considered as an important tool to determine spatial the pollutant concentration. Give formula for Gaussian plume model and describe the assumptions made in its derivation and its limitation. (8)
6. Determine the effective stack height for the following given data. The physical height for the stack is 203m tall with 1.07m inside diameter. The wind velocity is 13.32 km/h & the air temperature is 13^{0c}. The barometric pressure is 1000mili bar. Gas velocity is 9.14m/s. Stack gas temperature is 149^{0c}. (8)
7. Describe the following plume behavior in the following regime with neat a diagram (2*4=8)
 - a. Fanning
 - b. Fumigation
 - c. Looping
 - d. Coning

PART-B (2×20=40 Marks): Answer 2 question but question no 8* is mandatory**

8. Explain the following (5*4=20)
 - a. Objective criteria for selection of EIA method (5)
 - b. Cyclone separator & Electrostatic Precipitator (5)
 - c. Environmental Inversion (5)
 - d. Gravity Settler and Write the formula for calculating Cut diameter (5)
9. A large power plant has a 200 m stack with inside radius 2m. The exit velocity of the stack gas is estimated at 25m/s at the temperature of 140^{0c}. Ambient temperature is 25^{0c} and the wind at stack height is estimated to be 5m/s. Estimate the effective height of the stack. If
 - I. The atmosphere is stable with temperature increasing at the rate of 20/km.
 - II. The temperature is slightly unstable class C
 (10*2=20)
10. Describe following, (5*4=20)
 - a. Wind Rose and its application with diagram
 - b. EIA steps with flow chart
 - c. Attributes of drinking water
 - a. Fill in the blanks (W.R.T acid rain)

SO₂+OH=.....+.....

HOSO₂+O₂=.....+.....

SO₃+H₂O+M=.....+.....

NO₂+OHM=..... +.....

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