Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course/ Program: M.TECH (HSE & DM) **Semester : I**
Course Code: HSES7001 **Time : 03 hrs.**
Subject: Environmental Engineering & Management **Max. Marks: 100**
No. of page/s:4

SECTION A

S. No.	Answer all the question	Marks	CO
Q 1	Differentiate the following: i. Termigradation & Composting ii. Screening & Scoping	4	CO1
Q 2	What are El Niño and La Niña?	4	CO2
Q 3	Discuss briefly about designing aspect of sedimentation tank with standard dimension for wastewater treatment system.	4	CO4
Q 4	Explain following: i. Global warming ii. Eutrophication	4	CO2
Q 5	Describe the following plume behavior in the following regime with neat a diagram a. Fanning b. Fumigation c. Looping d. Coning e. Lofting & Trapping	4	CO2

SECTION B

	Answer four question.		CO
Q 6	Modeling is an important component of all environmental work at EPA. It helps inform both decisions and policies. Models improve the understanding of natural systems and how they react to changing conditions, such as exposure to hazardous substances and the temporal and dose effects from the exposure. Define stages of environment modeling? **OR** Enumerate the following: a) Cyclone separator with diagram b) Dry & Wet Scrubber with example	10	CO4

Q 7	A industry with 90 m stack with Outside radius 10m and inside radius 4m. The exit velocity of the stack gas is estimated at 20m/s at the temperature of 140^0c. Ambient temperature is equivalent to room temperature and the wind at stack height is estimated to be 5m/s and at half of the stack height is 4 m. Estimate the effective height of the stack. If 1. The atmosphere is stable with temperature increasing at the rate of 2^{0C}/km. 2. The temperature is slightly unstable class C	**10**	**CO4**
Q 8	Calculate the effective stack height for the following given data. The physical height for the stack is 250m tall with 2.07m inside diameter. The wind velocity is 13.32 km/h & the air temperature is 15^{0c}. The barometric pressure is 1000mili bar. Gas velocity is 9.14m/s. Stack gas temperature is 150^{0c}.	**10**	**CO5**
Q 9	Find the BOD of a seeded water sample at 25^{OC} and 30^{OC} if it has 300mg/l ultimate BOD at 20^{OC}. Consider dilution factor K=0.33.	**10**	**CO4**
	SECTION-C		
	Answer two questions.		
Q 10	Describe following, i. Designing aspect of sanitary landfill (4 Marks) ii. Termigradation (4Marks) iii. EIA steps with flow chart (8 Marks) iv. Acid rain (4Marks) **OR** Cleaning up our nation's wastewater is a priority. Currently, India dumps over 150 billion liters of untreated and undertreated wastewater (sewage) into our waterways every year. The Government of India worked with the provinces and engaged municipalities and others to strengthen the country's wastewater treatment and management system. Explain sewage/wastewater treatment plant with the help of flow diagram.	**20**	**CO4**
Q 11	Read the paragraph given below and answer all the questions. The biodegradation process is exothermic and well-operating compost will have a temperature between 55 and 60^0C during the period of active degradation. These temperatures are effective in destroying pathogens. The processing cycle for composting is about 20 to 25 days with active degradation taking place over a 10- to 15-day period . One of the major drawbacks of composting is odors. Maintenance of aerobic conditions and a proper cure time minimize odor problems. Compost is useful as a soil conditioner. In this role compost will:(1) improve soil structure, (2) increase moisture-holding capacity, (3) reduce leaching of soluble nitrogen, and (4) increase the buffer capacity of the soil. It should be emphasized that compost is not a valuable fertilizer. It contains only 1 percent or less of the major nutrients, such as	**20**	**CO5**

nitrogen, phosphorus, and potash. Composting is one of the fastest-growing aspects of ISWM. The driving force is legislation enacted to extend the life of landfills by removing yard waste from the waste stream. According to the EPA, recovery by composting was negligible in 1988.By 1990, EPA estimated that 2 percent of the nation's solid waste was being composted. The 2000 estimate was that 7 percent of the solid waste was being composted. In1994, over 3,000 composting facilities were operating in the United States. Sludge composting facilities numbered over 180, and municipal solid waste composting was being practiced by 21 cities (Monk, 1994).Methane is produced in sanitary landfills as a result of anaerobic decomposition of the organic fraction of the waste. In addition to gas extraction wells and a collection system, some gas processing equipment is employed. The minimum processing consists of dehydration, gas cooling, and, perhaps, removal of heavy hydrocarbons. The gas produced is a low-Joule gas having heating value of 18.6 MJ/m3. In high-Joule processing systems, carbon dioxide and some hydrocarbons are removed to yield essentially pure methane. The resulting gas is of pipeline quality and has a heating value of approximately 37.3 MJ/m3. The anticipated quantity of landfill gas (LFG) varies between 0.6 and 8.7 liters per kilogram of solid waste present per year (L/kg / y). The average production rate is 5 L/kg/ y. Although landfill sites as small as 11 ha have yielded substantial quantities of recoverable methane, the capital investment and complexity of the gas processing equipment will limit this technique to the larger sites (.65 ha). Otherwise, the technology is readily available and can make use of a resource that otherwise would dissipate into the atmosphere. According to EPA data, in 1999, 360 LFG-recovery projects nationwide produced the equivalent of 1,200 MW of power (Skinner, 1999).In the mid-1970s, under the auspices of the U.S. Environmental Protection Agency and with federal financing; several innovative high technologies for resource recovery were examined. At the end of the decade, a few workable systems and a large number of unworkable systems were identified. Because the successful high technology systems depend, to a large measure, on the recovery of energy for their success, we will consider the worth of solid waste as a fuel. On the other hand, its cost of $0.00/Mg may seem quite attractive. This is especially so when the price of anthracite coal may be $50/Mg and the price of No. 2 fuel oil is $250/Mg.

Answer the following:

a) Why sludge composting facilities and municipal solid waste composting is being practiced by 21 cities?
b) Solid waste management which is being practiced by many cities is one of the major components of sustainable development and it has many applications. Write that application and its impact on sustainable development.
c) Landfill is one of the techniques for management of organic solid waste .What is its advantage and disadvantage.