

2012-13

B.TECH. (WINTER SEMESTER) EXAMINATION
(MECH. / ARCH. / CIVIL. / CHEMICAL / PETROCHEMICAL / ELECTRICAL
/ ELECTRONICS / COMPUTER ENGINEERING)
(OPEN ELECTIVE)
SOLID WASTE MANAGEMENT
(CH-337)

Maximum Marks: 60

Credits: 04

Duration: Three Hours

Answer the questions in the order stated in the question paper.

Assume suitable data if missing.

Notations used have their usual meaning.

- | Q.No. | Question | M.M. |
|-------|--|------|
| 1(a) | Identify and discuss briefly the issues that you feel will be important in the field of solid waste management in the coming decades. | [07] |
| OR | | |
| 1(b) | State and explain various physical and chemical properties along with their significance in selecting an appropriate disposal technique | [07] |
| 1(c) | For a weekly waste production data from an industrial account for a calendar quarter of operation shown in Table I, determine the statistical characteristics and explain its physical significance. | [08] |

Table I : Weekly Waste Production Data

Week No.	Waste (m ³ /wk)	Week No.	Waste (m ³ /wk)
1	22	8	28
2	23	9	29
3	27	10	27
4	26	11	25
5	29	12	24
6	31	13	23
7	30		

- 2(a) What is a Hauled Collection System (HCS)? Discuss along with their types and personnel requirements. [08]

(OR)

- 2(a') Explain the following terms with reference to waste collection operation. [08]
- (i) Pickup
 - (ii) Haul
 - (iii) At Site
 - (iv) Off Route

- 2(b) The following average speeds (Table II) were obtained for various round trip distances to a disposal site. Find the haul speed constants, a and b, and the round trip haul time for a site that is located 18 km away. [07]

Table II : Round Trip Distance and Average Haul Speed

Round Trip Distance (x), km/trip	Average Haul Speed, km/h
2	27
5	30
8	52
12	58
16	65
20	68
25	73

- 3(a) Explain and illustrate various gas generation phases in an active landfill. [08]

(OR)

- 3(a') Explain the Water Balance Method for estimation of the quantity of landfill leachate. For an organic waste represented by $C_{620}H_{1555}O_{710}N_7S$, determine water consumed in the formation of landfill gas. [08]

- 3(b) A colony having a population of 500,000 generates solid wastes at the rate of 1.2 kg/capita/day. The compacted specific weight of solid wastes in landfill is 650 kg/m^3 and the average depth of compacted solid wastes in landfill is 5m. Determine the required landfill area including buffer zone for 20 years of operation. [07]

- 4(a) Draw a neat sketch of Flash Pyrolysis system and discuss its working along with the products obtained. [07]

(OR)

- 4(a') Discuss the design and operational considerations for the aerobic composting system. [07]

- 4(c) Determine the amount of oxygen required to oxidize 1000 kg of an organic solid waste aerobically. Assume that the initial composition of the organic material to be decomposed is given by $[C_6H_7O_2(OH)_3]_5$, that the final composition of the residual organic matter is estimated to be $[C_6H_7O_2(OH)_3]_3$, and that 400 kg of material remains after the oxidation process. [08]

2012-13

B.TECH. (WINTER VI SEMESTER) EXAMINATION
(CIVIL/ELECTRICAL/MECHANICAL/ELECTRONICS/COMPUTER/ARCHITECTURE/
CHEMICAL/PETRO-CHEMICAL ENGINEERING)
ATMOSPHERIC CHEMISTRY
(OPEN ELECTIVE) AC-308

Maximum Marks: 60

Credits: 04

Duration: Three Hours

Answer all the questions.

Marks allotted are indicated against each question.

Notations used have their usual meaning.

Q.No.	Question	M.M.
1(a)	Classify air pollutants. Write names of the criteria pollutants established by Environmental Protection Agency (EPA).	[04]
1(b)	What are the favourable conditions for the formation of carbon monoxide? Discuss its sources and physiological effects.	[06]
2(a)	Explain the terms: aerosols; fumes and smoke. Describe the physical, chemical and biological characteristics of particulate matter.	[06]
2(b)	Describe with the help of diagram the working of cyclone separator or spray tower.	[04]
3	Write short notes on any <u>two</u> of the following	[05×2]
	a) PRA method for SO ₂ determination	
	b) Ethylene blue method for H ₂ S	
	c) Nessler's method for ammonia	
4	Attempt any two of the following	[05×2]
	a) Discuss the significance of different zones of atmosphere.	
	b) Discuss with example the role of free radicals in the formation of photochemical smog.	
	c) Discuss the advantages and disadvantages of methanol and ethanol as alternative fuels.	
	d) Explain the harmful effects of indoor pollutants.	
5(a)	Explain electronic transition in a molecule when electromagnetic radiation (e.m.r.) of UV and visible range is absorbed.	[05×2]
5(b)	What is the basic principle of IR spectroscopy? Discuss in very brief the different components IR spectrometer.	
OR		
5(b')	Write the principle of atomic absorption spectrometry. Discuss in very brief the different components of atomic absorption spectrometer.	
6(a)	Discuss the role of biologically important UV regions (action spectra) of radiations on exposure to living organisms.	[05]
6(b)	Explain the role of chlorine released from Chloro-flouro carbons (CFCs) in catalytic destruction of stratospheric Ozone.	[05]

2012-13
B.TECH. (WINTER SEMESTER) EXAMINATION
OPEN ELECTIVE
BIOPHYSICS
AP-304

Maximum Marks: 60

Credits: 04

Duration: Three Hours

Answer all the questions.

Q.No.	Question	M.M.
1(a)	Define Ionization energy, Electron affinity, and Electronegativity.	[03]
1(b)	Describe interatomic potentials for strong and weak bonds.	[05]
1(c)	Explain the principle of Nuclear Magnetic Resonance (NMR).	[03]
1(d)	Give the name of three common methods for the determination of chemical structure. What are the basic features of XRD experiment?	[04]
OR		
1(d')	State the differences between electron microscopes and optical microscopes.	[04]
2(a)	Is heart really a pump? Show the pathway of blood circulation through it.	[05]
2(b)	Write the names of essential and non essential proteins. Why too much protein intake is bad for health?	[05]
OR		
2(b')	Explain the chemical (primary) structure of DNA in detail. Why G-C base pairing is stronger than A-T base pairing?	[05]
2(c)	How does a nerve signal pass through a nerve cell? What is the role of booster system in this passage?	[05]
3(a)	What are the different types of molecular spectra?	[05]
3(b)	How can you use rotational spectra to find intermolecular separation? In which region of e.m spectrum these spectra are located?	[05]
3(c)	Describe Raman effect and deduce an expression for Raman shift. Discuss the dependence of Raman spectral lines on particle size.	[05]
4(a)	What do you understand by 'tracer' and what are the requirements of a tracer?	[07]
4(b)	Find the rate of a chemical exchange reaction from the rate at which a tracer atom is exchanged.	[08]