KUMARAGURU college of technology
character is life

Register Number:……..…

M.E DEGREE EXAMINATIONS: APRIL / MAY 2024

(Regulation 2018)

Second Semester

ENVIRONMENTAL ENGINEERING

P18EEI2201**:** Air and Noise Pollution Control

COURSE OUTCOMES

CO1: Categorize the various sources, types and nature of air pollutants and their effects on living and non-living beings

CO2: Monitor the air quality standards and different sampling techniques

CO3: Determine the principle involved in the pollutant removal and their control measures

CO4: Understand the sources and effects of indoor and outdoor noise pollution

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A) Traffic smog is likely to occur in regions where vehicle mileage is considerable and there is low incidence of sunlight. CO1 [K_2]
   Reason (R): Traffic smog is caused by the reaction of oxides of nitrogen and some of the hydrocarbons in the presence of bright sunlight.
   a) Both A and R are Individually true and R is the correct explanation of A
   b) Both A and R are Individually true but R is not the correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

2. When ALR and ELR is in stable condition, the plume rise is known as ……. CO2 [K_1]
   a) Looping
   b) Fanning
   c) Fumigation
   d) Lofting

3. Which of the following are responsible for the formation of photochemical smog? CO1 [K_2]
   1. Light intensity
   2. Ratio of hydrocarbons to nitric oxide
   3. CO_2
   4. Hydrocarbon reactivity
   a) 1,2&4
   b) 1,2&3
   c) 2,3&4
   d) 2&4

4. Matching type item with multiple choice code CO1 [K2]

List I	List II
A. Sulfur dioxide	i. Damage ozone layer
B. Carbon dioxide	ii. Reduces oxygen carrying capacity of blood
C. Carbon Monoxide	iii. Acid rain
D. Chlorofluorocarbons	iv. Green house gas

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

5. Assertion: Activated alumina is used as a catalyst for removing gaseous pollutant from the ambient air. CO2 [K_2]

Reason: The concentration of hydrocarbon emitted from automobiles is 300-1000 mg/1.

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

6. 10 decibel increase in sound level will increase the loudness of sound by: CO4 [K_1]

a) 2 times
b) 5 times
c) 10 times
d) 100 times

7. Electrostatic precipitator is most useful in which one of the following industries? CO3 [K_1]

a) Tannery
b) Thermal power generation
c) Hydroelectric power generation
d) Textile factory

8. Assertion (A): Wet scrubber removes particulates from a gaseous stream. CO3 [K_2]

Reason (R): In the wet scrubber, water droplets come into contact with the particulates.

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

9. Radon gas from kitchen counter top may cause CO4 [K_1]

a) Dried skin
b) Asthma
c) Carcinogen diseases
d) Lung cancer

10. Which of the following air pollutants are released by thermal power plants ?(I) Oxides of nitrogen,(II) Oxides of sulphur,(III) Ammonia,(IV) Carbon monoxide — CO4 [K_2]

a) (I), (III) and (IV) only
b) (I), (II) and (IV) only
c) (II) and (III) only
d) (I), (II, (III) and (IV

PART B (10 x 2 = 20 Marks)

11. Describe how air quality is measured? — CO1 [K_2]
12. Indicate the sources of the following pollutants in the atmosphere: PM 2.5,SOX and NOx. — CO1 [K_2]
13. Calculate the AQI from 24 hours data — CO1 [K_3]

PM10-50 µg/m3
SO2 60 µg/m3
N_2O-200 µg/m3
Lead = 0.8 µg/m3

14. List the dispersion characteristics of stack plumes. — CO2 [K_2]
15. What are the assumptions involved in Gaussian Dispersion model? — CO2 [K_2]
16. Calculate the lapse rate on plume for the following data and comment your result. — CO2 [K_3]

Z (m)	T(‘C)
10	5.11
202	1.09

17. List the various types of particulate scrubbers. — CO3 [K_2]
18. Explain the mechanism of adsorption and absorption. — CO3 [K_2]
19. Define sick building syndrome. — CO4 [K_2]
20. List the various ill effects of noise pollution. — CO4 [K_2]

PART C (10 x 5 = 50 Marks)

21. Write down the functions of central boards for the prevention and control of air pollution under the air pollution act. — CO1 [K_2]
22. Determine the effective height of a stack, with the following given data: Physical stack is 180 m tall with 0.95 m inside diameter Wind velocity is 2.75 m/sec Air temperature is 20'C Barometric pressure is 1000 millibars Stack gas velocity is 11.12 m/sec Stack gas temperature is 160 °C. Assume any other data if necessary and mention them clearly — CO2 [K_3]

23.	Explain the sampling procedure of gaseous pollutant in ambient air.	CO2	[K_3]
24.	A city has the following description, W =5km, L =15KM u = 3m/s,H= 1000M.The upwind or background concentration of carbon monoxide is b =5 μg/m^3,.The emission rate per unit area is q = 4x10-6 g/s M2.What is the concentration c of carbon monoxide over the city? W, L, u, H have usual notations.	CO2	[K_3]
25.	Explain the control process of air pollution by combustion process.	CO3	[K_2]
26.	Discuss in detail about the factors considered in the selection of air pollution control equipment.	CO3	[K_2]
27.	Explain how the air containing units contribute to indoor air pollution.	CO4	[K_2]
28.	Discuss in brief the various sources of noise, and their typical noise levels.	CO4	[K_2]
29.	Explain the measures taken to control the noise pollution at source level.	CO4	[K_2]
30.	Explain the factors that might be primarily responsible for Sick Building Syndrome (SBS).	CO3	[K_2]

Answer any TWO Questions
PART D (2 x 10 = 20 Marks)

31.	A stack in an urban area is emitting 80g/s of NO. It has an effective stack height of 100m. The wind speed is 4 m/s at 10m. Estimate the ground level concentration at (i) 2km downwind on the centerline and (ii) 2km downwind, 0.1km off the centerline., σy = 290 and σz =220..	CO1	[K3]
32.	List and explain any three methods of controlling particulate emission from stack	CO3	[K_2]
33.	Explain the analytical procedure for the determining SO2 concentration from industry stack	CO2	[K_4]

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