CLASS: BTECH   SEMESTER : IV
BRANCH: CIVIL   SESSION : SP/2023

SUBJECT: CE420 AIR POLLUTION CONTROL
TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Convert the following air quality standards from ppm to (at 25°C and 1 atm) mg/m^3, or vice versa. (a) Carbon monoxide, (CO) 3.6 mg/m^3 (b) Nitrogen dioxide (NO_2), 25 ppm	[2]	1	3
Q.1(b)	Discuss the significance of emission inventory in air pollution?	[3]	1	3
Q.2(a)	Discuss the formation of ozone with respect to NO and NO_2 in ambient air.	[2]	1	3
Q.2(b)	Suppose propene, CH_4, is the hydrocarbon (RH) that reacts with the hydroxyl radical $OH^•$ in reaction (Eq.). Write the set of chemical reactions that end up with an aldehyde. What is the final aldehyde? [RH + $OH^•$ => $R^•$ + H_2O]	[3]	1	3
Q.3(a)	Discuss the selection of air pollution site selection criteria.	[2]	2	2
Q.3(b)	Discuss the manual and automatic analyzers used in ambient air pollution monitoring as per NAAQS.	[3]	2	2
Q.4(a)	Following data is given for any city. Which day is having highest AQI and which parameter? (Refer Table)	[2]	2	3

Pollutant	Day 1	Day 2	Day 3
O_3, 1-hr (ppm)	0.15	0.22	0.12
CO, 8-hr (ppm)	12	15	8
$PM_{2.5}$, 24-hr (mg/m^3)	130	150	10
PM10, 24-hr (mg/m^3)	180	300	100
SO_2, 24-hr (ppm)	0.12	0.20	0.05
NO_2, 1-hr (ppm)	0.4	0.7	0.1

			CO	BL
Q.4(b)	Discuss the mechanism for representative stack sampling for different types of stacks.	[3]	2	2
Q.5(a)	Discuss the importance of meteorological parameters in air pollution dispersion.	[2]	3	2
Q.5(b)	Discuss atmospheric stability with respect to lapse rate i.e., stable, unstable and neutral.	[3]	3	2

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Air Quality Index (AQI) Categories and Ranges

Category	AQI	8-hr O_3 (ppm)	1-hr O_3 (ppm)	24-hr $PM_{2.5}$ (µg/m³)	24-hr PM_{10} (µg/m³)	8-hr CO (ppm)	24-hr SO_2 (ppm)	1-hr NO_2 (ppm)
Good	0–50	0.000–0.064	—	0.0–15.4	0–54	0.0–4.4	0.000–0.034	—
Moderate	51–100	0.065–0.084	—	15.5–40.4	55–154	4.5–9.4	0.035–0.144	—
Unhealthy for Sensitive Groups	101–150	0.085–0.104	0.125–0.164	40.5–65.4	155–254	9.5–12.4	0.145–0.224	—
Unhealthy	151–200	0.105–0.124	0.165–0.204	65.5–150.4	255–354	12.5–15.4	0.225–0.304	—
Very Unhealthy	201–300	0.125–0.374	0.205–0.404	150.5–250.4	355–424	15.5–30.4	0.305–0.604	0.65–1.24
Hazardous	301–400	use 1-hr	0.405–0.504	250.5–350.4	425–504	30.5–40.4	0.605–0.804	1.25–1.64
	401–500	use 1-hr	0.505–0.604	350.5–500.4	505–604	40.5–50.4	0.805–1.004	1.65–2.04