Ref No: EX/PG/CE/T/115C/2024

M. Tech. Food Technology and Bio-Chemical Engg.1st Year First Semester Examination , 2024

M. E. Civil Engineering First Year First Semester Examination 2024

Environmental Pollution & Management

Time: Three Hours

Full Marks: 100

Use separate Answer-Scripts for each part

Part-1 (60 Marks)

Answer Question No. 1 & 2 and any **Two** from the rest.

1. Answer very briefly:

   a) What is the common reason of exclusion of Suspended Particulate Matter (SPM) from the list of criteria air pollutants (CAPs) of National Ambient Air Quality Standards (NAAQS)?

   b) Give examples of aerosol.

   c) What is the threshold pH for defining acid rain?

   d) Name the CAP other than SO_2 which should be minimized to control secondary particulate pollution.

   e) Mention aerodynamic diameter in meter of the CAP, which dictates Indian Air Quality Index (AQI).

   f) "NO_X is a CAP", Comment about x.

   g) Name three CAPs which may be measured by high volume respirable dust samplers (RDS).

   h) Name the air pollutant which was included in first revision of NAAQS.

   i) Name the PAH with five benzene rings only.

   j) What is the anhydride of sulphuric acid? 1X10=**10**

2. Answer very briefly

   a) Why might treatment alone not be sufficient to achieve the goal of sustainable development?

   b) Why isn't CO_2 considered a CAP?

[Turn over

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2(contd.) c) Compare various units used to express the standard concentrations of Indians CAPs.

d) Write the equation for destruction of the main photochemical oxidant.

e) Why is 100% source reduction of SO_2 not possible with the most common treatment method for coal?

f) Why indoor air quality standard should be more stringent?

g) What is the significance of 7μ-13μ wavelength range reradiated from the ground surface?

h) Mention two basic differences between a HCFC and a CFC?

i) 'London smog is also called _____ smog', mention three different words to fill in the blank.

j) Draw a complete sketch to show fanning plume pattern along with relevant lapse rates. 2X10=**20**

3. a) How can you contribute to controlling global warming?

b) Compare the numbering methods of CFCs, HCFCs, HFCs and halons with examples.

c) Sketch the ultraviolet portion of the combined absorption spectra of the atmosphere and provide the equations to explain that spectra. 5+5+5=**15**

4. a) How can you contribute to controlling formation of smog?

b) Write the equations for the followings:

(i) Acid Rain effect on marble

(ii) Formation of bicarbonate acidity in rainwater.

(iii) Formation of tropospheric ozone

(iv) Natural destruction of stratospheric ozone 7+8=**15**

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Part-1 (60 Marks)

5. Answer in one or two words:

a) What should be ozone concentration be, in Dobson Units (DU), for the undepleted stratospheric ozone layer?

b) If CO_2 corresponds to GWP, what corresponds to Ozone Depleting Potential (ODP)?

c) The term 'Acid Rain' is a misnomer, what would be a more appropriate term?

d) Which element leaching from acidified soil is most dangerous for aquatic ecosystem?

e) Which alphabet is typically used to designate the most common stability class?

f) What is the most prominent plume pattern?

g) What is the present ambient CO_2 concentration in ppm?

h) How many averaging time are mentioned in Indian NAAQS table?

i) Among the following particulate control equipment which one also controls gaseous air pollutants?

(i) Bag house (ii) ESP (iii) Scrubber (iv) Cyclone Separator

j) Mention the threshold temperature in Kelvin for formation of nitric oxide.

k) What is the main by-product of an ESP?

l) Which CAP is expressed in mg/m^3?

m) What should be the minimum air flow rate in m^3/min through a high volume sampler?

n) Mention the value of Saturated Adiabatic Lapse Rate (SALR)

o) What is the environmental lapse rate for an isothermal layer? **1X15 =15**

Form A: Paper –Setting Blank Ref No.: Ex/PG/CE/T/115C/2024

M.E. CIVIL ENGG. M.TECH. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING 1st YEAR 1st SEMESTER EXAMINATION, 2024

(1st / ~~2nd~~ Semester / ~~Repeat~~ / ~~Supplementary~~ / ~~Annual~~ / ~~Biannual~~)

SUBJECT: ENVIRONMENTAL POLLUTION & MANAGEMENT

(Name in full)

Full Marks: 100

Time: ~~Two hours~~/Three hours/~~Four hours~~/ ~~Six hours~~ (40 marks for this part)

Use a separate Answer-Script for each part

No. of Question	Part-II	Marks
	Answer Question-1 and any *two* from the rest	
Q.1) a)	What are the essential characteristics of an **"Eutrophic Lake"**?	**4**
b)	Describe with the help of a neat sketch the effect of **"Thermal Stratification"** on Dissolved Oxygen level of an **oligotrophic** and **eutrophic lake** during different seasons.	**6**
c)	Establish the relationship between different sound levels (L_I, L_P and L_W) in the context of **"Outdoor Noise"**.	**6**
d)	Derive the necessary expression for **"Addition of Sound Intensity Levels"**.	**4**
Q.2) a)	A township discharges **5.65MGD** of raw sewage, containing **7.4mg/L** of phosphorous and **17mg/L** of nitrogen, into an adjacent river that enters a lake short distance downstream.. For river it is given: i) average flow rate is **5823 l/sec.** ii) Mean nitrogen content= **0.21mg/L** iii) Mean phosphorous content= **0.03mg/L**. The lake is used as a municipal water source and has a surface area of **30,250 acres** and a mean depth of **10m.** Developments around the lake contribute an estimated **1837 Kg** of phosphorous and **11,791Kg** of nitrogen annually. Given for 10m depth, permissible loading for nitrogen= **1.5gm/m²/year** and permissible loading for phosphorous= **0.1gm/m²/year**. Estimate the followings: i. Nitrogen and phosphorous loadings from lake, river, sewage and in total. ii. Determine respective % removal of nitrogen and phosphorous in the sewage treatment plant.	**(6+4)**

Form A: Paper –Setting Blank Ref No.: Ex/PG/CE/T/115C/2024

M.E. CIVIL ENGG. M.TECH. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING 1st YEAR 1st SEMESTER EXAMINATION, 2024

(1st /~~2nd~~ Semester / ~~Repeat~~ / ~~Supplementary~~ / ~~Annual~~ / ~~Biannual~~)

SUBJECT: ENVIRONMENTAL POLLUTION & MANAGEMENT

(Name in full)

Full Marks: 100

Time: ~~Two hours~~/Three hours/~~Four hours~~/ ~~Six hours~~ (40 marks for this part)

No. of Question	Part-II	Marks
Q.3) a)	An electrical saw machine was subjected to a noise monitoring study and the results obtained in terms of **sound pressure level (L_P)** and **sound power level (L_W)** at a **30m** distance are furnished in the table below. Calculate the **total sound pressure level (L_{PT}) and total sound level (L_{PAT})** at a distance of **50m** from the unit. **Consider the propagation of sound under outdoor condition.**	(5+5)

Levels	Octave band centre frequency (in Hertz)							
	63	125	250	500	1000	2000	4000	8000
L_W in dB	97	95	91	92	89	86	87	78
L_P in dB	65	63	59	61	60	58	58	55

Q.4) a)	Discuss on the significance of "**Frequency Band Analysis**".	4
b)	**Vehicular Noise Data** was collected for an important traffic intersection and are furnished below:	(3+3)

Time (sec)	5	10	30	45	55	70	80	95	105	120	130	150
Sound Level dB(A)	72	76	75	78	81	82	77	79	74	80	71	73

Compute i) Equivalent Sound Level (L_{eq})

ii) Traffic Noise Index (TNI)