Master of   Engineering Examination 2018

(1st year 1st semester)

Environmental Pollution & Management

Time: Three Hours

Full Marks: 100

Use separate Answer-Scripts for each part (**60 marks for Part I** and 40 marks for Part II)

Part-1

Answer **Question No. 1** and any **Two** from the rest. Answers **Question No. 1** first.

1.   Answer briefly:

   a)   Draw a *sketch* to show the *hierarchy* of management of environmental pollution.

   b)   'Lapse rate is *favourable* in Troposphere'-explain with a *sketch*.

   c)   What are *criteria air pollutants* (CAPs)?

   d)   What may be '*primary* standard of *primary* air pollutant'?

   e)   Why is carbon monoxide emission from *industrial sources* comparatively less?

   f)   What is *aerodynamic* diameter? Give *examples*.

   g)   Name the *four air pollutants* which are generally measured by high volume samplers.

   h)   *When* was ammonia included in NAAQS and *why*?

   i)   How are the two organic CAPs *related*?

   j)   Name the *primary CAPs* to be controlled to control acid rain.

   k)   Name the GHG whose *GWP is unity* and why is it unity?

   l)   Comment about ODPs of *trichlorofluoromethane and hydrochlorofluorocarbons*.

   m)   Write the *catalytic reactions* related with control of photochemical smog.

   n)   With a sketch define '*NE*' wind.

   o)   Name two force field settlers along with *relevant forces*.

2X15=30

Master of Civil Engineering Examination 2018

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Part-1

2. a) Correlate the terms waste treatment, change of phase, threshold values, carrying capacity and sustainable development with examples from the field of air pollution.

    b) Draw the infrared portion of combined absorption spectra and define natural Greenhouse Effect.

    c) Draw the UV portion of global energy balance sketch and define albedo. Show that the albedo of e around one-fifth of the global albedo. Comment about it.

    $5+5+5=15$

3. a) 'Minimizations may be regarded as the only option to manage Ozone Depletion problem'-explain. 'Climate Change and Ozone Depletion problem should be solved in unison.'-explain.

    b) Define Acid Rain with respect to bicarbonate acidity only. Describe its effect on materials, aquatic ecosystem and forest ecosystem very briefly.

    c) Describe $NO-NO_2-O_3$ cycle. Mention its limitation.

    $5+5+5=15$

4. Define/Describe any **five** followings with sketches, wherever possible:

    (i) absolutely stable and absolutely unstable (ii) wind rose (iii) separation in high volume sampler (iv) fumigating plume (v) ESP (vi) Baghouse (vii) mixing height (viii) Wet Scrubber

    $3 \times 5 = 15$

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 **17 mg/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)

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(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)