B.E. CIVIL ENGG. 4th YEAR 1st SEMESTER EXAMINATION, 2019 (OLD)
(1st /2nd Semester / ~~Repeat~~ / ~~Supplementary~~ / ~~Annual~~ /~~Biannual~~)

SUBJECT: ENVIRONMENTAL POLLUTION & CONTROL
(Name in full)

Time: ~~Two hours~~/Three hours/~~Four hours~~/ ~~Six hours~~

Full Marks: 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Question	Part-I	Marks
	Answer Question-1 and 2 and any _two_ from the rest	
Q.1) a)	Fill in the blanks with appropriate word(s) i. As per UNEP, a country having per capita water availability of less than 500m³/year is termed as …………………… ii. Water stress indicator is defined as the ratio between water withdrawal and …………… iii. ………………… is a subjective characteristics of sound. iv. The mechanism involved in Reactive Expansion Chamber for the purpose of attenuating noise is called ……………………… v. …………… is expressed as the ability of solid waste to hold water against the action of gravity. vi. …………… refers to hauling of solid wastes to relatively far distances from collection areas or transfer stations.	6*1=6
b)	State whether the under-mentioned statements are True or False with necessary justifications: a. SAR is a critical water quality parameter for B-grade water use. b. The instrument used for measurement of sound is called sound pressure level meter. c. Liner arrangement is required in the containers for storing putrescible portion of municipal solid waste.	3*2=6
Q.2) a)	What do you mean by critical time period (t_c) in the context of stream sanitation? Deduce the necessary expression for critical time period (t_c).	2+4=6
b)	Establish the pertinent expression for addition of sound intensity levels.	4
c)	What do you mean by acoustic impedance? Establish the relationship between acoustic impedance and velocity of sound.	2+4=6
d)	Describe different activities involved in the "Stationary Container System" of solid waste collection with the help of a neat schematic diagram.	4

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Q.3)	A city discharges **100 m³/sec** of sewage into a river, which is fully saturated with oxygen and flowing at the rate of **1500 m³/sec** during its lean days with a velocity of **0.1m/sec**. The 5-days BOD of sewage at the given temperature is **280mg/L**. Find when and where the critical D.O deficit will occur in the downstream portion of the river and what is its magnitude. Assume a purification factor as **4.0**, deoxygenation coefficient as **0.15 per day** and saturation concentration of dissolved oxygen at the given temperature as **9.2 mg/L**.	9
Q.4)	Vehicular Noise Data was collected for an important traffic intersection and are furnished below:	(5+2+2) =9

Time (sec)	5	15	35	45	60	75	80	90	105	120	135	150
Sound Level dB(A)	72	75	74	78	82	80	79	77	76	81	71	73

Compute i) Equivalent Sound Level (Leq)
ii) L_{10} and L_{90} values

Q.5) a)	What do you mean by **"Proximate Analysis"** of a solid waste and what are the parameters resorted to in this type of analysis?	(2+2)
b)	A municipal solid waste sample was subjected to ultimate analysis yielding a chemical formula of $C_{447}H_{2029}O_{915}N_{13}S$. Calculate the higher and lower heat of combustion of the solid waste sample. Given i) moisture content of the solid waste sample = **21%**, flammable fraction = **56%**.	5

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(4th Year 1st semester)

Environmental Pollution and Control

Time: Three Hours   Full Marks: 100

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(50 marks for each part)

Part-II

Answer **Question No. 1** and <u>any Two</u> <u>from the rest</u>. Answers should be brief. Any relevant data may be assumed, if needed. <u>**Answer Question No. 1 first**</u>.

1.   a)   Why waste minimization is an essential step for management?

     b)   What is best form of recycling and why?

     c)   What was two-way catalytic convertor?

     d)   What is the basic difference between type of sources of CO and NO_X?

     e)   Define PM_{10}.

     f)   Why HCFC is used as an alternative of CFC?

     g)   What is the difference between organic and inorganic sulfur present in fuel?

     h)   What is 'Type 1' carcinogen?

     i)   What is the difference between ambiguity and eclipsing with respect to AQI calculation?

     j)   Define 'windrose'.   2x10=**20**

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Time: Three Hours

Full Marks: 100

(50 marks for each part)

2. a) Particulate matter (PM) concentrations in ambient air are to be measured using a high volume sampler with respirable dust attachment. The filter used for this purpose had an initial dry weight of 9.787 g. The initial air flow rate through the filter was set at 1.5 m^3/min. Sampling was continued for 4 hours. The airflow after 4 hours was measured to be 1.4 m^3/min. The dry weight of the filter paper after 4 hour sampling was 9.992 g. Initial and final weights of the pot are 25.123 g and 25.324 g respectively. Assuming a linear decline in the air flow rate during sampling, what are SPM & PM_{10} concentrations?

   b) Specific coal consumption of a 175 MW power plant is 0.7 kg/KWh. Using the equipment based general effluent standard (CPCB)formula $H=14(Q)^{0.3}$, calculate minimum stack height. Sulphur content of coal may be taken as 0.5 percent. Notations in the formulas have usual meanings.

   c) Show the conversion of ppm to $\mu g/m^3$ at standard temperature and pressure.

7+5+3=15

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3. a) Draw global energy balance sketch and define enhanced Greenhouse Effect (GHE).

    b) Draw the combined absorption spectra and define natural GHE

    c) Write the chemical formula of followings (i) HCFC-22 (ii) HFC-134

    d) Write the complete code number of followings (i) $C_2FH_3Cl_2$ (ii) CF_2HCl 5+6+2+2=**15**

4. a) 'Lapse rate in troposphere is favourable.'-explain with a sketch. When is it unfavourable in troposphere

        and why?

    b) Discuss ground level inversion with a sketch.

    c) Why are concentrations of pollutants generally more during winter season?

    d) There is a elevated inversion. Draw the plume patterns in the following cases:

        (i) there is no ground level inversion

        (ii) there is ground level inversion

                                                                5+3+3+4=**15**