

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 in one or two words:

- a) What is the common reason of inclusion of two organic air pollutants in the National Ambient Air Quality Standards (NAAQS) list as criteria air pollutants (CAP)?
- b) What does the subscript in PM₁₀ and PM_{2.5} represent?
- c) Mention the threshold pH of unpolluted rain water.
- d) Name two CAPs which should be minimized to control air pollution due to secondary particulate.
- e) Mention two particulate CAPs, which dictate AQI of India.
- f) What is the wavelength range of the UV ray which can reach to earth during ozone depletion?
- g) Name two gaseous CAPs which may be measured by high volume samplers along with particulates.
- h) When was suspended particulate matter (SPM) excluded from NAAQS?
- i) Name the PAH with five benzene rings only.
- j) What is the anhydride of sulfurous acid?

1X10=10

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M. E. Civil Engineering First Year First Semester Examination 2025**Environmental Pollution & Management**

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2. Answer very briefly

- a) Why waste treatment may not be sufficient to achieve the goal of sustainable development?
- b) Why is CO regarded as a CAP?
- c) Mention different mathematical units used to express the threshold concentrations of CAPs as mentioned in NAAQS table.
- d) Write the equation for formation of the CAP which is precursor for the formation of main photochemical oxidant.
- e) Why pulverization and subsequent washing of coal cannot minimize SO₂ completely?
- f) Why change of process is only practical option for minimization of NO_x, before its generation?
- g) Why indoor air quality standard should not be same as ambient air quality standard?
- h) Mention two basic differences between a Halon and a CFC?
- i) 'Photochemical smog is also called _____ smog', mention two different words to fill up.
- j) Draw a sketch to define mixing depth. 2X10=20

3.
 - a) Draw the combined absorption spectra of the atmosphere and define natural and man-made Greenhouse Effect from the spectra drawn.
 - b) Write the chemical formula of the following compounds: (i) HCFC-31 (ii) H-2311 (iii) CFC-113
 - c) Write code number of the following compounds: (i) CH₂F₄ (ii) CFCL₂CH₃ 10+3+2=15

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4. a) What is classical smog? Mention two CAPs related with this type of smog. Comment about their combined effect on respiratory system of human beings.
- b) Write the following equations of the reaction describing
- (i) the effect of Acid Rain on marbles
 - (ii) formation of bicarbonate acidity in rain water.
 - (iii) natural destruction of tropospheric ozone
 - (iv) formation of stratospheric ozone
- 7+8=15**
5. a) Compare stable and absolutely stable condition with the help of a sketch. What is the environmental lapse rate during neutral stability condition?
- b) Name and draw the plume patterns during following conditions:
- (i) ground level inversion below the stack height
 - (ii) ground level inversion above the stack height
 - (iii) ground level inversion below the stack height and an elevated inversion
 - (iv) stable calm condition
- 5+10=15**

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M.TECH. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING FIRST YEAR FIRST SEMESTER EXAM 2025

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M.E. CIVIL ENGG. 1st YEAR 1st SEMESTER EXAMINATION, 2025**(1st /2nd Semester / Repeat/ Supplementary / Annual /-Biannual)****SUBJECT: ENVIRONMENTAL POLLUTION & MANAGEMENT**

(Name in full)

Full Marks: 100Time: ~~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
	<u>Answer Question-1 and any two from the rest</u>	
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_1 , 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 5.45MGD of raw sewage, containing 7.3mg/L of phosphorous and 16mg/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= 0.22mg/L iii) Mean phosphorous content= 0.04mg/L. The lake is used as a municipal water source and has a surface area of 32,450 acres and a mean depth of 10m. Developments around the lake contribute an estimated 1846 Kg of phosphorous and 11,881Kg 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: - Nitrogen and phosphorous loadings from lake, river, sewage and in total. - 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 28m 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. <table border="1"> <tr> <th>Levels</th> <th colspan="8">Octave band centre frequency (in Hertz)</th> </tr> <tr> <th></th> <th>63</th> <th>125</th> <th>250</th> <th>500</th> <th>1000</th> <th>2000</th> <th>4000</th> <th>8000</th> </tr> <tr> <td>L_w in dB</td> <td>97</td> <td>95</td> <td>91</td> <td>92</td> <td>89</td> <td>86</td> <td>87</td> <td>78</td> </tr> <tr> <td>L_p in dB</td> <td>65</td> <td>63</td> <td>59</td> <td>61</td> <td>60</td> <td>58</td> <td>58</td> <td>55</td> </tr> </table>	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	(5+5)
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Q.4) a) b)	Discuss on the significance of "Frequency Band Analysis". Vehicular Noise Data was collected for an important traffic intersection and are furnished below: <table border="1"> <tr> <td>Time (sec)</td> <td>5</td> <td>10</td> <td>30</td> <td>45</td> <td>55</td> <td>70</td> <td>80</td> <td>95</td> <td>105</td> <td>120</td> <td>130</td> <td>150</td> </tr> <tr> <td>Sound Level dB(A)</td> <td>70</td> <td>76</td> <td>77</td> <td>78</td> <td>81</td> <td>82</td> <td>75</td> <td>79</td> <td>73</td> <td>80</td> <td>71</td> <td>74</td> </tr> </table> Compute i) Equivalent Sound Level (L_{eq}) ii) Traffic Noise Index (TNI)	Time (sec)	5	10	30	45	55	70	80	95	105	120	130	150	Sound Level dB(A)	70	76	77	78	81	82	75	79	73	80	71	74	4 (3+3)										
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