

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BE
BRANCH: BIOTECH/PROD/MECH**

**SEMESTER : VII
SESSION : MO/18**

SUBJECT: CE7021 ENVIRONMENTAL ENGINEERING

TIME: 3:00 HRS.

FULL MARKS: 60

INSTRUCTIONS:

1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

- Q.1(a) Explain theory of filtration. [2]
 Q.1(b) Explain different types of filtration. [4]
 Q.1(c) Explain schematically trickling filter process. [6]
 Q.2(a) What are elements of solid waste management? [2]
 Q.2(b) Estimate the hydrogen and oxygen fraction from the moisture content of a solid waste (100kg) with the following data: [4]

Component	Food wastes	Paper	Cardboard	Textile	Plastics	Wood	Garden wastes	Tin cans
Percent by Mass	14	40	9	7	9	6	10	5
Moisture content (%)	70	6	5	5	2	20	60	3

- Q.2(c) Chemical analysis of a above municipal solid waste (MSW) was done. Chemical components of a MSW is given below. Write approximate molecular formula [6]

Component	Wet weight (kg)	Moisture content	Dry wet (kg)	Chemical components (kg)					
				C	H	O	N	S	Ash
MSW	79.5	--	58.065	27.37	3.61	22.95	0.54	0.11	3.48
Molecular wt.				12	1	16	14	32	

- Q.3(a) What is criteria air pollutants? What are different criteria air pollutants? [2]
 Q.3(b) What are different air pollution episodes which cautious us about deleterious effects of pollution if proper care is not taken? [4]
 Q.3(c) What are the effects of pollutants released from stationary and mobile sources on human and nonliving's? [6]
 Q.4(a) What is temperature inversion? Is it good or bad for the air pollution dispersion point of view? [2]
 Q.4(b) Pressure is very important very meteorological parameter. Discuss it with reference to different geographical conditions. [4]
 Q.4(c) Discuss plume behavior with respect to dry adiabatic lapse rate and environmental lapse rate. [6]
 Q.5(a) Discuss impaction, interception and diffusion with respect to air pollution control. [2]
 Q.5(b) A cyclone with diameter (D) 1.0 m handles 3.0 m³/s of standard air carrying particles with a density (ρ_p) of 2000 kg/m³. For $N_e=6$, determine the cut size (d_{pc}) and the efficiency at particle diameter 5 μ m. ($\mu_g=1.81 \times 10^{-5}$ kg/m.s). The ratio of entrance height (a) =0.5 & entrance width (b)= 0.25. [4]
 Q.5(c) An ESP with 6000 m² of collector plate area is 97 % efficient in treating 200m³/s of flue gas from a 200 MW power plant. How large would the plate area have to be to increase the efficiency to 99 %? Discuss the result. [6]
 Q.6(a) What are methods of sound measurement? [2]
 Q.6(b) What are the strategies adopted to control noise pollution in industries? [4]
 Q.6(c) What is relationship between moving source and observer? How frequency and wavelength of sound are affected? [6]
 Q.7(a) What are important international environmental treaties that deal with air, water, hazardous waste, nuclear wastes? [2]
 Q.7(b) What is purpose of the air (prevention & control of pollution) act, 1981? What are highlights of this act? [4]
 Q.7(c) Why environment (protection) act, 1986 is called gamut of all laws? [6]