



**MAULANA ABUL KALAM AZAD UNIVERSITY OF  
TECHNOLOGY, WEST BENGAL**

**Paper Code : CH-301**

**BASIC ENVIRONMENTAL ENGINEERING AND ELEMENTARY BIOLOGY**

*Time Allotted:* 3 Hours

*Full Marks:* 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable. <http://www.makaut.com>*

**Group – A**

**(Multiple Choice Type Questions)**

1. Choose the correct alternatives for the following: 1×10=10
- (i) There are two samples of waste water sample; sample-I has BOD 200mg/L and sample-II has BOD 50 mg/L
- (a) Sample-II is more polluted than sample-I  
(b) Sample-I is more polluted than sample-II  
(c) The degree of pollution is same in both the sample  
(d) No inference can be drawn on the degree of pollution
- (ii) In carbonate hardness  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  are associated with
- (a)  $\text{SO}_4^{2-}$  <http://www.makaut.com> (b)  $\text{NO}_3^-$   
(c)  $\text{NO}_2^-$  (d) None of these
- (iii) Which of the following can be used for disinfection of water
- (a) ozone (b) hydrogen peroxide  
(c) chlorine (d) None of these
- (iv) Colloid particles remain suspended in solution because they have
- (a) net negative surface charge (b) net positive surface charge  
(c) no charge on surface <http://www.makaut.com> (d) None of these

- (v) Water will be considered saline if the TDS value is  
 (a)  $< 1500 \text{ mg/L}$  (b)  $> 5000 \text{ mg/L}$   
 (c)  $< 500 \text{ mg/L}$  (d) None of these
- (vi) The coldest region of atmosphere is <http://www.makaut.com>  
 (a) Troposphere (b) Stratosphere  
 (c) Mesosphere (d) Thermosphere
- (vii) Atmospheric radiative window is  
 (a)  $12 \text{ to } 18 \mu\text{m}$  (b)  $13 \text{ to } 18 \mu\text{m}$   
 (c)  $7 \text{ to } 12 \mu\text{m}$  (d)  $1 \text{ to } 15 \mu\text{m}$
- (viii) Minamata disease is due to following species:  
 (a)  $\text{Hg}^+$  (b)  $\text{CH}_3\text{Hg}^+$   
 (c)  $\text{Hg}^{2+}$  (d)  $\text{Cd}^{2+}$
- (ix) The atmosphere is neutrally stable under the condition of  
 (a)  $\text{ELR} > \text{ALR}$  (b)  $\text{ELR} < \text{ALR}$   
 (c)  $\text{ELR} = \text{ALR}$  (d) None of these
- (x) In the industrial area noise is measured by  
 (a)  $L_{10}$  (18 hrs) index (b)  $L_{eq}$   
 (c)  $L_e P_n$  (d) None of these

### Group – B

#### (Short Answer Type Questions)

Answer any three of the following.

5×3=15

2. What is trickling filter? Explain its use with a diagram. <http://www.makaut.com> 1+4=5
3. (a) What is noise dose and explain the same as recommended by Noise Control Board.  
 (b) What does the term "Three ways Catalytic Converter" mean? What catalyst is used in such Converter bed? 2+2+1=5
4. What do you understand by the term 'maximum sustainable yield'? Prove that  $N = K/2$  for maximum sustainable. 2+3=5
5. Prove that on the basis of global temperature model, the earth's surface temperature is  $\sim 19^\circ\text{C}$ . 5
6. (a) Define DALR and SALR.  
 (b) Derive  $-dT/dZ = g/C_p$  with usual notation. 2+3=5

**Group – C**

**(Long Answer Type Questions)**

**Answer any three of the following.**

15×3=45

7. (a) Instead of spherical shape if the earth had been flat, then what would have been the surface temperature of earth? Calculate on the basis of zero-dimensional energy balance model. [ $S = 1370 \text{ Wm}^{-2}$ ,  $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2} \text{ K}^{-4} \text{ s}^{-1}$ ,  $\alpha = 0.31$ ]. <http://www.makaut.com>
- (b) What is the global temperature model?
- (c) What are biochemical effects of arsenic and cadmium?
- (d) What is difference between sulphurous smog and photochemical smog? 5+2+5+3=15
8. (a) What is ecosystem? Discuss a Mangrove forest as a natural ecosystem with all of its components.
- (b) What is resource? What is the difference between resource and reserve?
- (c) Write a short note on EIA.
- (d) How the green houses gases helps to maintain the earth average temperature of  $15^\circ\text{C}$ . (1+4)+(1+2)+3+4=15
9. (a) Sometimes packaged drinking water is labelled as 'Ozonised water': What do you mean by ozonised water?
- (b) Describe, in brief, about the various process involved in surface water treatment to make it of drinkable quality. <http://www.makaut.com>
- (c) What is the basic difference of noise pollution from any other pollution? What is noise threshold limit values? A sample of ground water has 140 mg/Litre of  $\text{Ca}^{2+}$  ions. Express its hardness in units of mg/Litre of  $\text{CaCO}_3$ .
- (d) Which one of the species  $\text{Hg}^0$ ,  $\text{Hg}^{+1}$ ,  $\text{Hg}^{+2}$  and  $\text{CH}_3\text{Hg}^+$  is most toxic and why? If a Chemical industry discharges 'Hg' marine water the fish in the bay were found to contain  $\text{CH}_3\text{Hg}^+$ : How can you explain this missing link? 2+5+(1+2+2)+(1+2)=15
10. (a) Define 'decibel' and 'Sound Pressure level'. 1+1=2
- (b) What is 'Noise Threshold Limit value'? Noise in an area is measured as and permissible noise exposure duration is given below. Find out whether working environment is good for the worker or not?

Noise level dBa	100	95	90	75
Measured hours	$\frac{1}{2}$	1	3	3
Permissible hours	1	2	4	$\infty$

2+2=4

- (c) What is adiabatic lapse rate and environmental lapse rate? Considering the two lapse rates explain the term "Mixing height" and "Ventilation Coefficient". <http://www.makaut.com> 1+1+1+1=4
- (d) What are the differences between photochemical smog and sulphurous smog? 3
- (e) What is 'Montreal Protocol'? 2

11. Write short notes on *any three* of the following: 5×3=15

- (a) Hydrologic cycle
- (b) Rotating Biological Contractor (RBC)
- (c) Oxidation Ponds
- (d) Biodiversity Hot-Spot
- (e) Eutrophication <http://www.makaut.com>
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