ENVIRONMENTAL ENGINEERING & POLLUTION CONTROL
(CHEN 4243)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) As per the CPCB standard for discharge of liquid waste into inland surface water the values of BOD in mg/l for treated waste water is
(a) 150 (b) 0
(c) less than or equal to 30 (d) >30.

(ii) The theme of World Environment Day 2018 is related to
(a) desert & desertification
(b) beat plastic pollution
(c) zero tolerance for the illegal wildlife trade
(d) seven billion dreams. One Planet — consume with care.

(iii) Which of the following is the secondary air pollutant?
(a) NO_x (b) SPM (c) PAN (d) SO_x.

(iv) Grey water is also termed as
(a) sullage (b) grit (c) moss (d) sewage.

(v) Plastic containers should not be used in microwave for heating food as
(a) it is poor conductor of heat
(b) it may contaminate food with BPA or PCB
(c) it may break or produce electric flashes
(d) it is costly.

(vi) Identify the methodology of solid waste management which is practised in Kolkata Municipal Corporation.
(a) Landfill (b) Incineration
(c) Compaction followed by dumping (d) Composting.

(vii) A permit which allows a country to produce a certain amount of carbon emissions and which can be traded if the full allowance is not used is known as
(a) Carbon Footprint (b) Carbon Flip Bond
(c) Carbon Credit (d) None of the above.

(viii) Blue-Light Hazard is associated with
(a) LED Light (b) CFL
(c) X-ray (d) Nichrome Filament Light.

(ix) The waste stabilization pond needs
(a) Aerator (b) Primary clarifier
(c) Facultative pond (d) Secondary clarifier.

(x) Identify the oldest Act for protection of Environment in India.
(a) Water Act (b) Bengal Smoke Nuisance Act
(c) Air Act (d) E-waste (Management) Rules.

Group – B

2. (a) Discuss in brief the significance of Water Act 1974.

(b) A multi-tray settling chamber having 8 trays, including the bottom surface, handles 6 m^3/s of air at 20^0C. The trays are spaced 0.25 m apart and the chamber is to be 1 m wide and 4 m long. What is the minimum particle size of density $2000kg/m^3$ that can be collected with 100% efficiency? What will be the efficiency of the settling chamber if 50 μm particles are to be removed? Laminar flow condition within the chamber and presence of no dust initially on trays may be assumed.

4 + (4 + 4) = 12

3. (a) Discuss the Construction and Operation of a Respirable High Volume Sampler with a neat sketch.

(b) What is Windrose? Discuss its construction methodology.

7 + 5 = 12

Group – C

4. (a) A wastewater treatment plant discharges 1.0 m^3/s of effluent having an ultimate BOD of 40.0 mg/L, into a stream flowing at 10.0 m^3/s. Just upstream from the discharge point, the stream has an ultimate BOD of 3.0 mg/L. The deoxygenation rate coefficient is 0.22/day. Assuming complete and instantaneous mixing, find ultimate BOD of the mixture of waste and river just downstream from the outfall.

(b) Assuming a constant cross-sectional area for the stream equal to 55 m^2 what ultimate BOD would you expect to find at a point 10,000 m downstream?

6 + 6 = 12

5. (a) Discuss the principle of a Trickling Filter with a neat sketch.

(b) Design a trickling filter with recirculation using a suitable empirical method for data supplied: Sewage flow = 5000 m^3/day; Raw settled BOD = 200 mg/l; Filter depth D = 1.8m; Media = 7.5 –10 cm diameter stones. The efficiency of the filter would be about 85%.

5 + 7 = 12

Group – D

6. (a) Discuss the management and handling methodologies of Bio medical waste in India.

(b) Write Technical notes on E-waste.

5 + 7 = 12

7. Briefly describe the collection and disposal methods of solid waste practised in Kolkata Municipal Corporation (with explanatory diagrams wherever necessary).

6 + 6 = 12

Group – E

8. Delineate a case study on pollution control in a tannery mentioning:
(i) target pollution loads
(ii) treatment technologies and
(iii) key issues.

(3 + 5 + 4) =12

9. Write Technical notes on:
(i) Root Zone/Reed Bed treatment
(ii) Ranking of waste water treatment alternative.

6 + 6 = 12