B.TECH / BT /7TH SEM/ BIOT 4142/2017
ENVIRONMENTAL BIOTECHNOLOGY
(BIOT 4142)

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) Mist is a
(a) liquid with droplet size less than 10 μm
(b) gas with molecule size less than 10 μm
(c) liquid with droplet size more than 10 μm
(d) gas with molecule size more than 10 μm.

(ii) PAN is a
(a) underground water pollutant (b) primary water pollutant
(c) reserved water pollutant (d) secondary water pollutant.

(iii) Substrate removal efficiency in activated sludge process is high when
(a) F/M ratio is large (b) F/M ratio is small
(c) F/M ratio is 1 (d) none of these.

(iv) Infra red radiation is absorbed by
(a) sulphur dioxide (b) hydrocarbons
(c) nitric oxides (d) carbon monoxide.

(v) Bacterial-algal symbiosis is observed in
(a) aerobic pond (b) activated sludge process
(c) Facultative pond (d) both (a) and (c).

(vi) Xenobiotics are
(a) any chemical that contain carbon
(b) products used for biological control of pests
(c) special soil amendments used for organic farming
(d) synthetic organic farming not found in nature.

(vii) Phytoremediation can clean up polluted soils by using
(a) plants to take up and accumulate the pollutant so that it can be removed when the plant is harvested
(b) plant cover to prevent surface soil heating
(c) anaerobic bacteria to degrade toxic compounds
(d) all of the above.

(viii) _____ waste can be broken down by living things.
(a) Biodegradable (b) Glass (c) Hazardous (d) Non-biodegradable.

(ix) Ex-situ bioremediation involves
(a) degradation of pollutant by microbes directly
(b)removal of pollutants and collection at a place to facilitate microbial degradation
(c) degradation of pollutants by genetically modified pollutants
(d) none of these.

(x) The last stage of anaerobic digesion is
(a) acetogenesis (b) methanogenesis
(c) hydrolysis (d) acidogenesis

Group - B

2. (a) A multitray settling chamber handles 6m^3/s of air at 200C. There are 8 trays including the bottom surface, spaced 0.25 m apart. The chamber is 4 m long and 1 m wide. For particles of density 2000 kg/m^3 and sizes 70 μm, calculate the residence time, the distance settled and the efficiency of collection. (Assume laminar flow.)

(b) What do you mean by combustion?

(c) Explain how can you control air pollution with the help of Thermal incinerator.

(2 + 2 + 2) + 2 + 4 = 12

3.(a) Write notes on Particulate matter.

(b) Explain how atmospheric carbon monoxide can be measured with the help of NDIR?

6 + 6 =12

Group - C

4. (a) Write notes on Oxygen demanding wastes.
   (b) Compare BOD and COD.
   (c) How can you determine trace elements in a water sample?

5 + 3 + 4 = 12

5. (a) How the Total organic carbon of waste water can be estimated?
   (b) Write notes on Oxygen sag curve.

5 + 7 =12

Group - D

6. (a) Explain the biological steps involved in the process of anaerobic digestion.
   (b) What is the necessity of multiple stage digesters for increasing the efficiency of anaerobic digestion process?
   (c) Name two reactors which can be used for biogas production by anaerobic digestion process.

6 + 4 + 2 = 12

7. (a) How temperature of the aerobic composting process changes with the time of progress of composting?
   (b) Mention three important factors which influence the efficiency of composting. Also explain how they affect the process.

6 + (2 + 4) = 12

Group - E

8. (a) Write down the steps for terminal oxidation of n-alkane.
   (b) What is the biochemical basis of bacterial microbial resistance?
   (c) Why PAH s (Polycyclic aromatic hydrocarbons) cannot be degraded by most bacteria?

4 + 4 + 4 = 12

9. Write short notes on: **(2 × 6) = 12**
   (i) Biostimulation
   (ii) Bioaugmentation