Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.TECH(FT)(N)/SEM-3/CH(FT)-301/2011-12

2011

BASIC ENVIRONMENTAL ENGINEERING & 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.

GROUP – A
(Multiple Choice Type Questions)

1.   Choose the correct alternatives for the following : $10 \times 1 = 10$

    i)   Temporary hardness of water is due to the presence of polyvalent metallic ions associated with

        a)   nitrate   b)   sulfate

        c)   chloride   d)   bicarbonate.

    ii)   Food chain which directly depends on solar flux is

        a)   grazing   b)   detritus

        c)   general food chain   d)   all of these

    iii)   The coldest region of the atmosphere is

        a)   troposphere   b)   stratosphere

        c)   mesosphere   d)   thermosphere.

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iv) In an industrial area noise is measured by

    a) L_{10} (18 hrs) index   b)   Leq

    c)   both (a) and (b)   d)   none of these.

v) The normal hearing frequency range is

    a)   20 Hz - 40000 Hz   b)   60 Hz - 40000 Hz

    c)   20 Hz - 20000 Hz   d)   60 Hz - 60000 Hz.

vi) Montreal protocol is related to

    a)   disarmament   b)   freeze on use of CFCs

    c)   water pollution   d)   land pollution.

vii) Environmental Impact Assessment (EIA) needs to

    a)   start a project   b)   evaluate a project

    c)   stop a project   d)   none of these.

viii) In energy pyramid, the bottom level represents

    a)   consumers   b)   producers

    c)   scavengers   d)   decomposers.

ix) The unit of biochemical reaction rate constant (K_1) is

    a) T^{-1} b) ML^{-1}

    c) $ML^{-1}T^{-1}$ d) $M^{-1}LT^{-1}$.

x) Aspergillus bacteria play a significant role in the

    a)   nitrogen cycle   b)   phosphorus cycle

    c)   sulfur cycle   d)   oxygen cycle.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following   3 × 5 = 15

2. "Carbon dioxide, though considered as a non-pollutant, is perhaps the single most important environmental problem facing us at present." Explain the statement in terms of greenhouse effect.
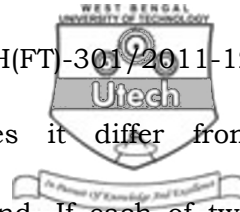
3. Define photochemical smog. How does it differ from industrial smog ?

4. Calculate the intensity of a 100 dB sound. If each of two machines produces sound of 50 dB simultaneously, what will be total sound intensity level ? Given the reference intensity = 1×10^{-12} W/m^2

5. State Darcy's law for groundwater flow and hence define hydraulic conductivity. 3 + 2

6. How do you broadly classify the components of municipal solid waste ? Based on your classification, suggest suitable disposal method of each component. 5

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. 3 × 15 = 45

7. a) Why 5-day, 20°C BOD value is accepted universally as a parameter to quantity biodegradable organic waste ? 3

   b) In a rare case BOD value of an industrial wastewater may be obtained greater than COD value. Try to explain the typical content of this wastewater. 2

   c) Try to establish the relationship among BOD exerted after time *t*, ultimate BOD, biochemical reaction rate content and time with regard to a wastewater sample. 5

   d) Given the 5-day, 20°C BOD value of a wastewater is 250 mg/L, what will be its ultimate BOD value ?

   (K_1 = 0·23/day). 5

8. a) What is Dry Adiabatic Lapse Rate ? 2

   b) Derive a relation of the variation of temperature with altitude for a percel of air undergoing dry adiabatic lapse rate. 6

   c) What is London smog ? 2

   d) What is PAN ? Explain its formation chemically. 1 + 4

9. a) Discuss effect of oxygen demanding wastes on river. 3

    b) How the oxygen level of river is replenished ? 3

    c) What is Eutrophication ? 3

    d) What are the effects of eutrophication of environment ?

    3

    e) How can you control eutrophication ? 3

10. a) What is activated sludge ? 3

    b) Draw a complete flow sheet of activated sludge process. 5

    c) What is food-to-microorganism ratio ? Why is it maintained in the aeration tank ? 2 + 1

    d) Why a portion of secondary sludge is returned to the reactor ? 2

    e) What is MLVSS ? 2

11. a) What are the catalytic reactions that destroy ozone layer ? 3

    b) What are effects of ozone destruction ? 3

    c) What is ozone depletion potential ? 2

    d) What are the substitutes of CFC ? 2

    e) Write short notes on temperature inversion. 5

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