2016

BASIC ENVIRONMENTAL ENGINEERING & ECOLOGY

(CHEM 2001)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

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

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

<u>GROUP - A</u> (Multiple Choice Type Questions)

1. Choose the correct alternative for the following:

[10 x 1=10]

| i) | Ozone is a pollutant when present in | | | | | | | |
|------|---|----------------------|--------------------|------------------|-------------------------|------------------|--|--|
| | a) tropospher | e b) strato | sphere | c) mesosp | here | d) ionosphere | | |
| ii) | Gene bank is | one kind of | | | | | | |
| | a) ex situ cons | servation | | b) | b) hot spot | | | |
| | c) artificial eco | artificial ecosystem | | | d) in situ conservation | | | |
| iii) | Temporary hardness of water is due to the presence of | | | | | | | |
| | a) Cl | b) SO42- | c) PO ₄ | 3- | d) HC | O ₃ - | | |
| iv) | Blue baby syndrome is related to | | | | | | | |
| | a) nitrite | b) sulphate | c) pł | nosphate | (| d) carbonate | | |
| v) | Which of the following is a primary air pollutant? | | | | | | | |
| | a) SO ₂ | b) O ₃ | c) P | AN | d) H | ЮНО | | |
| vi) | Human speech is in the range of | | | | | | | |
| | a) 20-20000Hz | | | b) 2000-5500Hz | | | | |
| | c) 200-3000Hz | | | d) none of these | | | | |

| vii) | The decomposer could be | | | | | | |
|-------|--|------------------|----------------------|-----------------|--|--|--|
| | a) amoeba | b) earthworm | c) fungi | d) all of these | | | |
| viii) | The best method of biomedical waste disposal is | | | | | | |
| | a) incineration | b) composting | c) landfill | d) all of these | | | |
| ix) | Dioxin, a carcinogen may be a by-product during which of the following disposal method | | | | | | |
| | a) Incineration c) Window composting | | b) Sanitary landfill | | | | |
| | | | d) Encapsulation | | | | |
| x) | Which of the following is a symbolic bacteria? | | | | | | |
| | a) Rhizohium h) | Azobactor c) Nit | rosomonas | d) Micrococcus | | | |

GROUP - B

- 2 a) In an eco system, energy flow is unidirectional but nutrient flow is cyclic- explain.
 - b) Briefly discuss carbon cycle showing schematic diagram.
 - c) What is maximum sustainable yield? Prove that maximum sustainable yield following logistic growth of population is (dN/dt)max = rK/4, the terms have their usual meaning.
 - d) What is sustainable development?

3 + 3 + (1+3) + 2 = 12

- 3 a) Prove that, when population growth follows logistic function, N= K/2 for maximum sustainable yield, where symbols have their usual meaning.
 - b) Define eco system. Discuss the biotic and abiotic components of a terrestrial ecosystem mentioning their correlation.
 - c) What are the macro and micro nutrients?
 - d) What is a chemoautotroph? Give example.

3 +(2+3)+2+2=12

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GROUP - C

- 4 a) On the basis of global temperature model(including earth's ALBEDO) prove that the earth's surface temperature is -19°C.
 - b) How is sulphurous smog formed? What are the effects of sulphurous smog?
 - c) Write a short note on (i) Kyoto Protocol (ii) Cyclone separator.

(3)+(2+3)+(2+2) = 12

- 5 a) What is the average temperature of the earth's surface considering the earth to behave as a black body? (ignore earth's ALBEDO)(Solar constant $S = 1372 \text{ W/m}^2$ and Stefan Boltzmann constant $\sigma = 5.67 \times 10^{-8} \text{ W/m}^2\text{K}^4$
 - b) What is global warming? What are the effects of global warming?
 - c) What are the effects of ozone layer depletion? What is importance of Montreal protocol on control of CFC?

(3)+(2+3)+2+2 = 12

GROUP - D

- 6 a) Write the Darcy's Law.
 - b) Write the differences between BOD and COD.
 - c) What is eutrophication? Discuss different types of Eutrophication.
 - d) What is noise pollution? Calculate the intensity of 100dB sounds. (Reference intensity = $1 \times 10^{-12} \text{ w/m}^2$)

2+3+(1+3)+1+2=12

- 7 a) Describe with figure different kinds of aquifers.
 - b) What are the sources of Mercury(Hg) contamination in water? Describe the biochemical effects of the above heavy metal.
 - c) What are oxygen demanding wastes? Give examples.
 - d) What is dBA scale ? What are the drawbacks of dBA scale?(3)+(1+2)+(1+1)+(2+2)=12

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GROUP - E

- 8 a) Write a short note on landfill. Write its advantages and disadvantage.
 - b) What is recycling ? How will you convert waste to wealth?
 - c) What is environment management? What are the main components of environment management?

(3+2)+(1+3)(1+2)=12

- 9 a) Write down the differences between Environmental Auditing(EA) and Environmental Impact Assessment(EIA).
 - b) What is the requirement of Green Chemistry in today's scientific world?
 - c) What are the biomedical wastes? What is the best way to dispose biomedical wastes?
 - d) Discuss with diagram the working principle of modern sanitary landfill process for the safe disposal of solid waste.

3+3+(1+1)+4=12