B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2010

00564

ET-507(A) : POLLUTANTS AND WATER SUPPLY

Time : 3 hours   *Maximum Marks : 70*

Note :   *Answer six questions in all. Question number 1 is compulsory. Use of calculator is permitted.*

1.   Choose the most appropriate alternative for each of the following :   **10x1=10**

  (a)   The most significant primary gaseous pollutant found in vehicular emissions, is :

   (i) CO (ii) CO_2

   (iii) SO_2 (iv) O_3

  (b)   Priming of a centrifugal pump is necessary :

   (i)   If it is located above the reservoir level

   (ii)   If it is located below the reservoir level

   (iii)   If delivery head is high

   (iv)   If discharge is high

(c) The study of earth's atmosphere and its changes, is called :

(i) environmental engineering

(ii) ecology

(iii) meteorology

(iv) philology

(d) Heavy loading of pollen grains in air, may cause :

(i) anaemia   (ii) typhoid

(iii) hay fever   (iv) influenza

(e) Carbon monoxide is hazardous to health, because :

(i) it causes loss of sense of smell

(ii) it is carcinogenic in nature

(iii) it reduces oxygen carrying capacity of blood.

(iv) it may cause conjunctivitis

(f) Longer exposure to NO_2 even in small concentrations, may cause diseases pertaining to :

(i) lever   (ii) lung

(iii) kidneys   (iv) heart

(g) The filter system which filters out the gaseous emissions, is called a :

(i) trickling filter

(ii) moving bed filter

(iii) bag house filter

(iv) none of the above

(h) Presence of higher algal content in water indicates that water is :

(i) having high BOD

(ii) free from oxygen

(iii) saturated with oxygen

(iv) none of the above

(i) The atmosphere extends upto a height of 10,000 km. It is divided into the following four thermal layers.

(1) Mesophere   (2) Stratosphere

(3) Thermosphere   (4) Troposphere

The correct sequence of these layers starting from the surface of the earth upwards is :

(i) 2, 4, 1, 3   (ii) 4, 2, 1, 3

(iii) 4, 2, 3, 1   (iv) 2, 4, 3, 1

(j) Electrostatic precipitators are used as pollution control device for the separation of :

(i) SO_2

(ii) NO_x

(iii) Hydrocarbon

(iv) Particulate matter

2. (a) What would be the impact on the environment if sulphate aerosols are injecting in the stratosphere to reduce the possibilities of global warming ? Discuss.   **2x6=12**

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(b) Laboratory analysis of an industrial waste water sample indicated an ultimate BOD of 780 mg/l and rate constant (k) of 0.25 per day at 20°C. Calculate the 5 day BOD at 20°C and at 30°C.

3. (a) With a neat diagram, show inlet, outlet, settling and sludge zones of a settling basin. Explain the functions of these zones also.

(b) A pipe line 90 cm diameter bifurcates at a Y junction into two branches, 50 cm and 40 cm in diameter. If the rate of flow in the main pipe is 2500 litres/sec and mean velocity of flow in 40 cm diameter pipe is 10 m/sec, determine the rate of flow in 50 cm diameter pipe. **2x6=12**

4. (a) Describe the suitability of different air pollution control devices with respect to different pollutants. **2x6=12**

(b) In a filter bed spherical particles of 0.60 mm size has been used. If there are 45% voids, calculate the surface area of particles per cubic metre of the filter bed.

5. (a) Discuss the suitable solid waste management systems in the context to Indian Urban Solid Waste. **2x6=12**

(b) Explain the significance of E-coli in water analysis.

6. (a) What are the various operational troubles in rapid gravity filters ? Discuss the cleaning of rapid gravity filters. **2x6=12**

   (b) State the important parameter to be analysed for water supply to a high pressure boiler.

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7. (a) What is meant by "disinfection" in treating public water supply ? Give three major requirements of a disinfectant. **2x6=12**

   (b) The diameter of a tube well is 40 cm and the thickness of the aquifer is 16 m. The radius of circle of influence of the well is 140 m. The co-efficient of permeability of soil is 42 m/day. Calculate the draw down of the well when the yield of the well is 2500 m^3/day.

8. (a) Describe the reciprocating pump with a sketch explaining its functioning for taking out water from a tube well. **2x6=12**

   (b) After a 45 day sampling period, 480 mg of dust got settled into a 180 mm diameter dust fall bucket. Express the dust fall in terms of g/m^2/month.

9. Write short notes on *any four* of the following :

4x3=12

    (a) Reverse Osmosis

    (b) Zeolite softeners

    (c) Super chlorination

    (d) Brownian motion

    (e) Biochemical Oxygen Demand (BOD)

    (f) Industrial effluent.

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