Diploma in Civil Engineering

Term-End Examination

June, 2007

BCE-033 : ENVIRONMENTAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question No. 1 is **compulsory**. All questions carry equal marks.*

1. Choose the correct alternatives : *14*

(a) As per National Building Code, domestic consumption of water in an Indian city under normal conditions, has been taken as

(i) 135 kilolitre/head/day

(ii) 135 litre/head/day

(iii) 150 litre/head/day

(iv) 150 litre/head/hour

(b) Discharge from an artesian well is given by

(i) $\frac{1{\cdot}36\,K(H^2 - h^2)}{\log\left(\frac{R}{r}\right)}$

(ii) $\frac{2{\cdot}72\,KZ(H - h)}{\log\left(\frac{R}{r}\right)}$

(iii) $\frac{2{\cdot}72\,K(H^2 - h^2)}{\log\left(\frac{R}{r}\right)}$

(c) Water is considered 'soft', if hardness does ***not*** exceed

(i) 50 ppm

(ii) 150 ppm

(iii) 200 ppm

(iv) 300 ppm

(d) The water having pH equal to 7 is

(i) acidic

(ii) alkaline

(iii) neutral

(iv) None of the above

(e) Water entering rapid sand filter has high turbidity as compared to slow sand filter. This statement is

(i) True

(ii) False

(f) The most widely used coagulant for water treatment is

(i) lime and soda

(ii) ferrous sulphate

(iii) chlorinated copperas

(iv) alum

(g) Detention period (t) for a rectangular sedimentation tank, passing discharge (Q) and having length = L, width = B and depth = H is given by

(i) $\frac{B.L.H}{2}$

(ii) $\frac{2}{B.L.H}$

(iii) $\frac{2}{B.L}$

(iv) None of these

(h) B.H.P. of a pump is

(i) WH / 75

(ii) WH / 75E

(iii) None of the above

(i) A manhole is generally classified as deep manhole, if its depth is more than

(i) 0·9 m

(ii) 1·2 m

(iii) 1·5 m

(iv) 2 m

(j) A combined sewage system collectively carries

(i) Domestic and industrial sewage

(ii) Storm sewage and domestic sewage

(iii) Storm sewage and industrial sewage

(iv) Storm sewage and sanitary sewage

(k) Chemical Oxygen Demand (COD) of sewage is the

(i) Oxygen required to oxidise organic matter by strong oxidising agent under acidic condition

(ii) Oxygen required to oxidise biologically active organic matter

(iii) Both (i) and (ii)

(iv) None of the above

(l) Centrifugal Pump is suitable for

(i) High heads

(ii) Medium heads

(iii) Low heads

(iv) Both (i) and (ii)

(m) Hypochlorite ions are more effective in removing bacteria than hypochlorous acid. This statement is

(i) True

(ii) False

(n) Screens are provided to remove colloidal particles present in water. This statement is

(i) True

(ii) False

2. (a) Classify wells according to (i) water flow conditions (ii) method of construction. Explain the set-up of tube wells with a neat sketch. *9*

(b) Write important considerations for selection of source of water for a town or city. *5*

3. (a) What are various water treatment processes ? Give a schematic layout of a water treatment plant. *7*

(b) What do you understand by sedimentation with Coagulation ? Enumerate the chemicals which are used for Coagulation. Explain any one. *7*

4. (a) Describe with the help of sketches, various types of layout used in water distribution system. *9*

(b) List various appurtenances used in house water connection. *5*

5. (a) Draw a neat sketch of a centrifugal pump set-up showing its main components. *9*

(b) Differentiate between centrifugal pump and reciprocating pump with reference to (i) discharge of flow (ii) head obtained (iii) speed (iv) efficiency (v) floor space required. *5*

6. Discuss the working principle of activated sludge process. Draw a flow diagram in schematic form of waste water treatment plant that includes activated sludge process. *14*

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(i) Waste water reuse

(ii) Waste water disposal

(iii) Sludge thickening

(iv) Water borne diseases

(v) Jet pumps

(vi) Slow sand filter

(vii) Pre-treatment of water

(viii) Thermal reduction of sludge