KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Marks Scored:

Level : B.E.
Year : III

Course : CIEG 313
Semester: II

Exam Roll No. :

Time : 30 mins.

F. M. : 10

Registration No.:

Date AUG 2 4 2018

SECTION "A"
[20 Q. × 0.5=10 marks]

Encircle the most appropriate answer among the given choices.

1. The joint commonly used for connecting small diameter C.I pipes used for internal plumbing is
   a) collar joint
   b) screwed and socket joint
   c) victaulic joint
   d) flanged joint

2. If 20 ml of an odourous water sample needed 180 ml of odour free distilled water to produce 200 ml of odour free mixture, then the threshold odour number (TON) is
   a) 0.1 b) 0.9 c) 10 d) 20

3. Non-filterable residue of a water sample represent
   a) dissolved solid
   b) suspended solid
   c) colloidal solid
   d) organic solid

4. The conveyance system in which strength of sewage is reduced than its initial strength is
   a) separate system
   b) combined system
   c) partially separate system
   d) partially combined system

5. In extended aeration process, long aeration time is used to operate the process at
   a) endogenous stage
   b) stationary stage
   c) declining growth stage
   d) log growth stage

6. A waste water sample of 2 ml is made up to 300 ml in a BOD bottle with distilled water. Initial DO of the sample is 8 mg/l and after 5 days it is 2 mg/l. Its BOD is
   a) 6 mg/l b) 450 mg/l c) 600 mg/l d) 900 mg/l

7. The layout of water distribution system which provide larger quantity of water for firefighting is
   a) dead end system
   b) grid iron system
   c) ring system
   d) radial system

8. The water which is neither chemically pure nor contain anything harmful matters to human health but contains useful minerals to the human health is termed as
   a) potable water b) palatable water c) pure water d) wholesome water

9. Sewer appurtenance which can be provided instead of man holes is
   a) clean out b) catch pit c) leaping weir d) flushing tank

10. High rate trickling filter is the
a) attached growth aerobic process
b) attached growth anaerobic process
c) suspended growth aerobic process
d) suspended growth anaerobic process

11. Water from the following source is likely to be hard
a) river b) lake c) deep well d) shallow well

12. Sludge conditioning is done to
a) stabilize sludge
b) increase the solid content in sludge
c) decrease the water content in sludge
d) improve dewatering characteristics of sludge

13. The per capita per day demand of water is taken as an average value over a period of
a) 24 hours b) one month c) one year d) one decade

14. In waste stabilization pond the dissolved oxygen in wastewater is sustained by
a) bacteria
b) algae
c) mechanical aerator
d) diffused aerator

15. The suitable method of forecasting population for towns and cities whose development is likely to take place according to the national growth is
a) master plan method
b) ratio method
c) logistic curve method
d) geometric increase method

16. BOD represents
a) pollution strength of a waste
b) pollution strength of inorganic fraction of waste
c) pollution strength of an organic fraction of waste
d) pollution strength of bio-degradable organic fraction of waste

17. Super-chlorination is done
a) day to day treatment
b) during summer
c) during an epidemic
d) when no other treatment is resorted to

18. The technique of overland runoff for disposal of sewage by land treatment is applied when
a) soil have poor permeability
b) soil have good permeability
c) sewage is from household
d) sewage is from industries

19. A discrete particle is one
a) whose settling is unaffected by the neighbouring particles
b) whose settling influences neighbouring particles
c) for which hindered settling takes place
d) which settles as compressed settling

20. Suspended solids are less in ground water because
a) they are absorbed by the soil
b) they readily settle to the bottom
c) they are set floating on water
d) they are filtered through the soil layers

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SECTION "B"

[4Q.× 5= 20 marks]

Attempt ***ANY FOUR*** questions. Assume suitable data where necessary.

1. a. Draw the schematic layout plan of water treatment plant and list its components. [2]

   b. In a town it has been decided to provide 200 lpcd water to people. Estimate the domestic water requirements of this town in the year 2020 AD by projecting the population of the town by the incremental increase method for the following data: [3]

Census year	1940	1950	1960	1970	1980
Population	2,50,000	4,80,500	5,50,300	6,38,600	6,95,200

2. a. Define flow through period and detention period in a sedimentation basin. [2]
   b. Enumerate the various types of intakes and describe any one in detail with a neat sketch. [3]

3. a. Define sedimentation. Draw the neat label sketch of rapid sand filter. [2]
   b. Explain why and how the multiple tube fermentation test is conducted. [3]

4. a. Explain "turbidity" in water. [1]
   b. Find the diameter of a 900 m long equivalent pipe with Hazen William's coefficient of 100 to replace the series-parallel system between A-B as shown in the Figure 1. [4]

Pipe	Length, m	Diameter, mm	Hazen William's coefficient
1	300	250	120
2	400	300	130
3	200	200	100
4	500	400	130
5	300	250	80

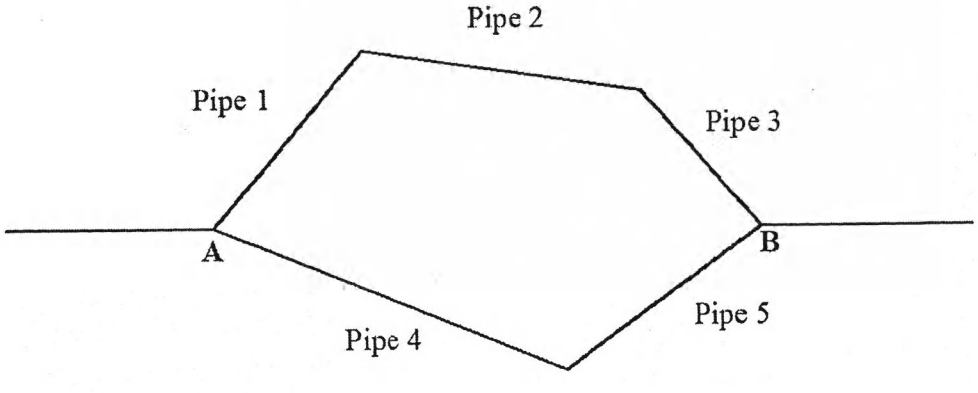

Figure 1

5. Design pipeline AB and BC in the pipe network as shown in Figure 2. Minimum pressure in pipeline should be 1.5 kg/cm^2. Take Hazen William's coefficient as 100. [5]

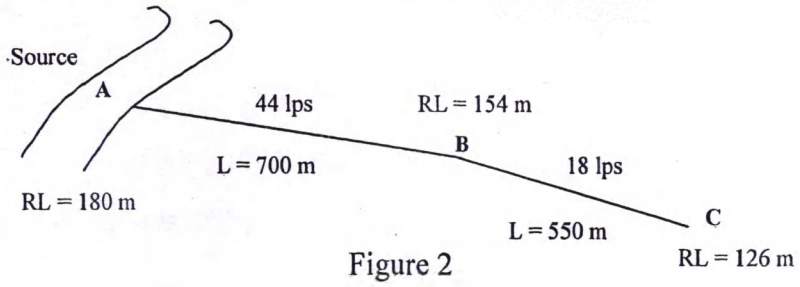

Figure 2

SECTION "C"

[4Q.x 5 = 20 marks]

Attempt *ANY FOUR* questions. Assume suitable data where necessary.

6. a. Explain in detail the necessity of examination of wastewater characteristics. [2]
   b. Explain the various reasons for selecting E-Coli as an indicator organism for fecal contamination. [3]

7. a. Why secondary treatment is necessary for wastewater? [2]
   b. Explain in detail the biological process involved in working of a trickling filter. [3]

8. a. Explain the working principle of grease and oil trap. Mention the reasons for excluding grease and oil from wastewater. [2]
   b. Explain various types of storm regulator with neat sketches. [3]

9. a. Explain the method of dewater of sludge suitable in context of terai region with appropriate sketch. [3]
   b. List out the various methods of sludge disposal. Explain any one in detail. [2]

10. A river having a flow of 5 cumec with 5 day BOD of 1 mg/l and saturated with oxygen receives a sewage with effluent discharge of 2 cumec, 5 day BOD of 20 mg/l and DO of 2 mg/l. Calculate the DO deficit at a point 20 km downstream. Also, find the amount of critical DO deficit and its location in the downstream portion of the river.
    Assume uniform velocity of flow equal to 0.3 m/s, saturation DO as 9.17 mg/l for a constant temperature of 20° C, K= 0.12 per day (base 10) and R= 0.36 per day (base 10). [5]