

B.E. CONSTRUCTION ENGINEERING SECOND YEAR FIRST SEMESTER SUPPLEMENTARY EXAM - 2018

Subject : WATER RESOURCES ENGINEERING

Time : Three hours

Full Marks : 100

PART-I

**Instructions:**

1. Answer all questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

1. (a) Explain the biological treatment techniques for treating waste-water **OR** Activated Sludge Process. (14)

2. A. (i) Deduce an expression for determining BOD at any time. What are the factors on which the De-oxygenation constant (K) depends?

(ii) The BOD of a sewage incubated for one day at 30°C has been found to be 125mg/l. What will be the 5 day 20°C BOD? Assume  $K = 0.15$  (Base 10) at 20°C.

**OR**

B (i) The 3 day 37°C BOD of a sample of sewage is 400ppm. What will be its 10 days 20°C BOD, and day 30°C BOD?

(ii) Draw a flow diagram from an outfall to the disposal into a river valley after complete treatment for a proposed sanitary project of a town. Indicate the significance of each unit adopted during the process treatment. (18)

3. A (i) What is Manholes? Explain the need of manhole. Draw neat sketch of deep manhole.

(ii) Write short notes on any three of the followings.

- (1) Lamp hole.
- (2) C.O.D
- (3) Population Equivalent.
- (4) TOC.

**OR**

B (i) Mention the merits of trickling Filter.

(ii) Find the diameter of a circular sanitary sewer for the following data:

(1) Population = 1, 60,000.00. (2) Average Sewage Flow = 200litres/head/day. (3) Slope of sewer = 1 in 1000. (4) Value of n in Manning's formula = 0.015. (18)

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**B. Construction Engg. 2<sup>nd</sup> Yr 1<sup>st</sup> Sem. Supple Exam.2018**

**Sub.: Water Resources Engg.**

**(Part – II)**

**Answer Q. No. 1 and any two from the rest.**

1. i) Write TRUE or FALSE:

1 x 5

- a) For estimating the missing precipitation data  $P_x$ , there is no importance of the average annual rainfall of the unknown station (x).
- b) The coefficient of variation in connection with the optimum number of rain gauges is inversely proportional to the sample standard deviation.
- c) In order to obtain the surface runoff graph from the runoff hydrograph, the base flow is required.
- d) Ranking of the storm is the product of recurrence interval and total number of years on record.
- e) Suitable importance is attached to the various stations in 'Thiessen's' and 'Isohyetal' methods, but not in 'arithmetic mean' method.

ii) Write short notes on the following:

1x5

- a) Pan shaped catchment and fern shaped catchment
- b) Hydrograph
- c) Determination of velocity of stream
- d) Recurrence interval of time
- e) Infiltration capacity curve

2. a) What do you mean by  $W_{index}$  and  $\Phi_{index}$ ? Explain giving suitable sketches wherever necessary.

b) The following are the rates of rainfall for successive 20 minutes period of a 140 minutes storm: 2.5, 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr. Taking the value of  $\Phi_{index}$  as 3.2cm/hr, find out the net runoff in cm, the total rainfall and the value of  $W_{index}$ . 5 + 15

3. a) What is the equation of the infiltration capacity curve? Show that on a log-log scale, this equation represents a straight line having a slope =  $-1/(K \log_{10} e)$ .

b) Following velocities were recorded in a stream with a current meter.

Depth above bed (m):	0	1	2	3	4
Velocity, m/sec	0	0.5	0.7	0.8	0.8

Find the discharge per unit width of stream near the point of measurement. Depth of flow at the point was 5m.

10 + 10

4. a) Write a short note on measurement of rainfall by rain gauges.

b) In a typical 4 hr. storm producing 50mm of excess rain from a basin, the following flows in the stream, are recorded:

Time in hours	Flow in cumecs
0	0.0
2	1.22
4	4.05
6	6.75
8	5.67
12	3.375
16	1.35
20	0.0

a) Plot the unit hydrograph of run off for this storm.

b) Estimate, as accurately as possible, the peak flow and the time of its occurrence, in a flood created by a 8 hours storm, which produces 2.5cm of effective rainfall during the first 4 hours and 3.75 cm of effective rainfall during the second 4 hours. Assume the base flow to be negligible.

5 + 15