CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **15CV71**

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Municipal and Industrial Wastewater Engineering

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the need for Good sanitation. Describe types of sewerage system and their suitability. **(10 Marks)**

   b. Explain factors affecting wet weather flow and the effects of flow variations on the design of sewerage system. **(06 Marks)**

OR

2 a. Define Sewer Appurtenances and explain with neat sketch construction and working of manhole. **(06 Marks)**

   b. What do you understand by the term Low – cost treatment? **(02 Marks)**

   c. Explain the following with sketches :
   i) Septic tank   ii) Oxidation pond. **(08 Marks)**

Module-2

3 a. Explain briefly the dilution method of disposal of sewage. What are the factors which influence the choice of the method to be adopted? **(06 Marks)**

   b. Design a sewer to serve a population of 36,000, the daily per capita water supply allowance being 135 lt, of which 80%, find its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry four times the dry weather flow, when running full. What would be the velocity of flow in the sewer when running full? **(10 Marks)**

OR

4 a. Discuss in details the process Deoxygenation and Reoxygenation with respect to self – purification of Natural water with a neat sketch. **(08 Marks)**

   b. Write short notes on :
   i) Sewage sickness   ii) Sewage farming. **(08 Marks)**

Module-3

5 a. Write the flow diagram employed for a municipal wastewater treatment plant. Indicate the importance of each unit indicated in the flow diagram. **(10 Marks)**

   b. Explain the importance of screens and types of screens in the sewage treatment process. **(06 Marks)**

OR

6 a. Determine the size of the High rate Tricking Filters for the following data :
   i) Sewage flow = 4.5 MLD   ii) Recirculation ratio = 1.5
   iii) BOD of Raw sewage = 250 mg/L   iv) BOD removal in primary tank = 30%.
   v) Final effluent BOD desired = 30 mg/L. **(08 Marks)**

   b. Explain briefly the different stages of sludge digestion process in a "Digestor". With a neat sketch, explain the constructional details of sludge digestion tank. **(08 Marks)**

Module-4

7   a. Differentiate between Domestic sewage and Industrial waste.   (08 Marks)
    b. Explain the methods used for Neutralization of Acidic and Alkaline waste.   (08 Marks)

OR

8   a. Briefly explain the effects of Industrial wastewater on sewage treatment plants.   (08 Marks)
    b. Explain different methods of Strength Reduction.   (08 Marks)

Module-5

9   a. With process flow diagram, explain the cotton textile mill wastes origin.   (08 Marks)
    b. Enumerate the effects of discharging paper and pulp industrial wastes into water bodies or sewers.   (08 Marks)

OR

10 a. With process flow diagram, explain the origin of wastes from Cane Sugar mill. List its characteristics.   (08 Marks)
    b. With a flow diagram, explain the units used for treatment of Dairy waste on receiving stream.   (08 Marks)

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Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Design of RCC and Steel Structures

Time: 3 hrs.   Max. Marks: 80

Note: 1. *Answer any TWO full questions, choosing one full question from each module.*
2. *Use of IS-456, IS-800 SP (6) and Steel tables are permitted.*

Module-1

1   Design a slabtype rectangular combined footing for two columns of size $300mm \times 450mm$ and $300mm \times 600mm$, subjected to axial loads of 650 kN and 900 kN respectively. The columns are spaced at 3.6 m c/c. The width of the footing is restricted to 1.8 m. Use M20 grade concrete and Fe415 grade steel. Assume SBC of soil = 160 kN/m². **(40 Marks)**

OR

2   Design a Cantilever retaining wall to retain an earth embankment with a horizontal top 3.50 m above ground level. The unit weight of back fill is 18 kN/m³. Angle of internal friction $\phi = 30°$. SBC of soil = 180 kN/m². Take coefficient of friction between soil and concrete = 0.55. Adopt M20 grade concrete and Fe415 grade steel.
Depth of foundation = 1.0 m.   **(40 Marks)**

Module-2

3   Design a roof truss shown in Fig. Q3 with forces in each member of the truss are given in table Q3. The size of RC column supporting the truss is $300mm \times 300mm$. Use M20 grade concrete for column. Design the truss using bolt of M16, property class 4.6 for connections and also design anchor bolts.   **(40 Marks)**
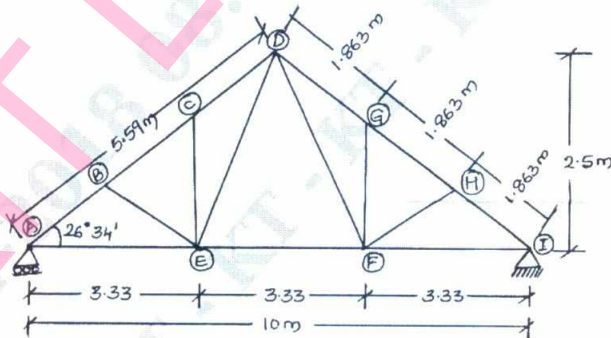

Fig. Q3

Member	Design force in kN	
	Compression	Tension
Top chord member	54.25	-
Bottom chord member	-	48.31
Diagonal member (DF, DE)	14.35	-
Member BE, HF	-	24.50
Member CE, GF	12.40	-

OR

4   Design a simply supported crane gantry girder for the following data: The crane is electrically operated. Yield stress of steel is 250 N/mm^2.

     (i)   Span of Crane girder = 20 m
     (ii)   Effective span of gantry girder = 7.4 m
     (iii)   Capacity of crane = 220 kN.
     (iv)   Self weight of Crane girder excluding crab = 200 kN.
     (v)   Weight of Crab = 60 kN.
     (vi)   Wheel base distance = 3.4 m
     (vii)   Minimum hook approach = 1.2 m.
     (viii)   Self weight of rail = 300 N/m
     (ix)   Height of rail = 75 mm

Gantry girder is to be supported on RCC column bracket of size $300mm \times 450mm$. Size of column $300mm \times 600mm$.   **(40 Marks)**

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Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 80

Note: 1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Assume missing data suitably.*

Module-1

1 a. With engineering representation, explain hydrologic cycle along with processes involved in it. **(06 Marks)**
   b. Explain how consistency of rainfall data is checked using double mass curve technique. **(05 Marks)**
   c. The average annual rainfall of 5 raingauge stations in a basin are 89, 68, 54, 45, 41 and 55 cm. If the error in the estimation of basin rainfall should not exceed 10%. How many additional raingauges should be installed in the basin. **(05 Marks)**

OR

2 a. Define precipitation. List its types and explain with neat sketch how its amount is measured using Symon's raingauge. **(08 Marks)**
   b. What are the importances of hydrology? With neat sketch explain mass curve of rainfall and rainfall hyetograph. **(08 Marks)**

Module-2

3 a. Explain how evaporation amount is measured using IS class-A pan? List the factors affecting it. **(08 Marks)**
   b. What is evapotranspiration? Write its measurement using Lysimeter method, with sketch. **(05 Marks)**
   c. List the factors affecting evapotranspiration. Write Blaney-Criddle equation used to estimate ET. **(03 Marks)**

OR

4 a. Define infiltration. With neat sketch, explain double ring infiltrometer. **(06 Marks)**
   b. Write a Horton's infiltration equation used to estimate infiltration rate. **(02 Marks)**
   c. For a storm of 3 hr duration the rainfall rates are as follows:

Time Period (minutes)	30	30	30	30	30	30
Rainfall rate (cm/hr)	1.4	3.4	4.8	3.2	2.0	1.2

If the surface run off is 3.4 cm determine the ϕ-index and W-index assume initial ϕ-index is more than 1.4 cm/hr. **(08 Marks)**

Module-3

5 a. What is runoff? List and explain factors affecting it. **(08 Marks)**
   b. Define hydrograph. With sketch explain component parts of hydrograph. **(08 Marks)**

OR

6 a. The hourly ordinates of a two hour unit hydrograph are given below. Derive a 6-hours unit hydrograph for the same catchment. **(08 Marks)**

Time (hours)	00	01	02	03	04	05	06	07
Discharge (Cumecs)	00	1.0	2.7	5.0	8.0	9.8	9.0	7.5

Time (hours)	08	09	10	11	12	13	14	15
Discharge (Cumecs)	6.3	5.0	4.0	2.9	2.1	1.3	0.5	00

b. Find out the ordinates of a storm hydrograph resulting from a 3 hour storm with rainfall of 3, 4.5 and 1.5 cm during subsequent 3 hour intervals. The ordinates of unit hydrograph are given in the table below.

Hours	00	03	06	09	12	15	18
OVH (cumecs)	00	90	200	350	450	350	260

Hours	21	24	03	06	09	12
OVH (cumecs)	190	130	80	45	20	00

Assume an initial loss of 5 mm infiltration index of 5 mm / hr and base flow of 20 cumecs. **(08 Marks)**

Module-4

7 a. Define Irrigation. List and explain benefits and ill effects of irrigation. **(08 Marks)**
   b. What are Duty, delta and base period? Explain factors affecting Duty of water. **(08 Marks)**

OR

8 a. What is Irrigation efficiency? Define different efficiencies of Irrigation water. **(05 Marks)**
   b. What are flow Irrigation and Lift Irrigations. Explain types of flow irrigations. **(08 Marks)**
   c. (i) Give relationship between Duty, delta and base period.
      (ii) Write a short note on frequency of Irrigation. **(03 Marks)**

Module-5

9 a. What is canal? List its types and explain with neat sketch its classification based on Alignment. **(08 Marks)**
   b. Explain different storage zones of reservoir with neat sketch. **(08 Marks)**

OR

10 a. The Channel section is to be designed for the following data:
   Discharge, Q = 5 cumecs
   Lacy's silt factor, f = 1
   Side slope = $1\frac{1}{2}$ H to 1 V

   Also determine the bed slope of the channel. **(08 Marks)**
   b. Explain hydrological investigations of reservoir planning. List the points to be considered for selection of site for a reservoir. **(08 Marks)**

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15CV741

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Design of Bridges

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing
ONE full question from each module.
2. Use of IS-456, IRC-5, IRC-6, IRC-21, IS1343, pigeaud's
curves and relevant charts allowed.

Module-1

1 a. How are the bridges classified, briefly explain. **(10 Marks)**
   b. List the various loads to be considered in the design of bridges. **(06 Marks)**

OR

2 Briefly explain the following terms:
   i) Linear waterway
   ii) Economic span
   iii) Afflux
   iv) Scour Depth. **(16 Marks)**

Module-2

3 Design a deck slab for the following details:
   Carriage way   = Two lane (7.5m wide)
   Foot paths   = 1m on either side
   Clear span   = 6m
   Wearing coat   = 80mm
   Width of bearing   = 400mm
   Materials : M25 grade concrete and Fe415 grade HYSD bars
   Loading : IRC class AA tracked vehicle. **(16 Marks)**

OR

4 Design a SKEW slab culvert to suit the following data:
   Clear span   = 6m
   Width of bearing   = 370mm
   Width of carriage way = 7.5m
   Overall depth of slab = 540mm
   Wearing coat   = 80mm
   Skew angle   = 30°
   Loading : IRC class AA tracked vehicle
   Materials : M20 grade concrete and Fe415 HYSD bars. **(16 Marks)**

Module-3

5 Design the 'Deck slab only' for the T-beam bridge for the following data:
   Effective span = 16m; Live Load – IRC class AA tracked; Materials – M25 grade concrete and Fe415 steel; spacing of the cross girders 4m c/c ; width of carriage way = 7.5m ; thickness of wearing coat = 80mm ; Kerbs on either side = 600mm wide × 300mm deep ; width of main girder = 300mm ; width of cross girder = 300mm ; spacing of main girders = 2.5m c/c ; sketch reinforcement details. **(16 Marks)**

OR

6 Design T-beam bridge "cross girder" for the data given in Q5 and sketch the reinforcement details. (16 Marks)

Module-4

7 Design a Reinforced concrete box culvert having a clear vent way 3m by 3m. The super imposed dead load on the culvert is 12.8 kN/m^2. The Live Load is estimated as 50 kN/m^2. Density of soil at site is 18 kN/m^2. Angle of repose = 30°. Adopt M20 grade concrete and Fe415 steel. Sketch the details of reinforcement. (16 Marks)

OR

8 Design a suitable reinforced concrete pipe culvert to suit following data:

Discharge through pipe culvert = 1.57m^3/s
Velocity of flow through pipe = 2m/s
Width of road = 7.5m
Top width of embankment = 1.5:1
Bed level of stream = 100.00 m
Top of embankment = 103.00 m

Loading : IRC class AA Wheeled vehicle. (16 Marks)

Module-5

9 Verify the stability of the abutment shown in Fig.Q.9. The other salient details are given below:

Material = Concrete
Density of soil = 18 kN/m^3
Coefficient of friction = 0.6
Angle of repose of soil = ϕ = 30°
Live Load on bridge = IRC class AA tracked
Span of bridge = 15m
Angle of friction between the soil and concrete = 18°

The bridge deck consists of three longitudinal girders of 1.4m depth with a deck slab of 200mm depth. (16 Marks)

Fig.Q.9
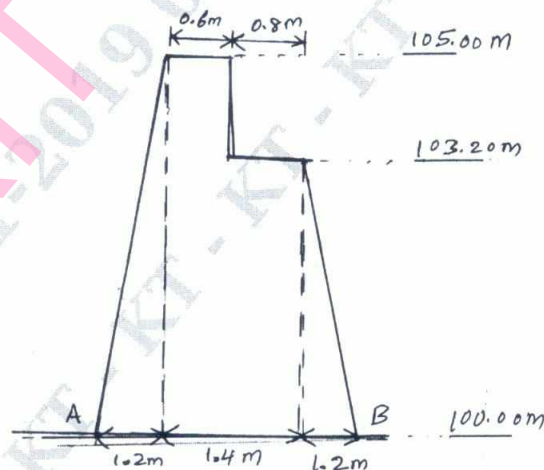
OR

10 Write short notes on:
a. Bridge bearings
b. Hinges
c. Expansion Joints (16 Marks)

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Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Urban Transportation and Planning

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is urbanization? State the causes of urbanization. (08 Marks)
   b. Explain the problems in the urban transportation in the present scenario. (08 Marks)

OR

2 a. Explain the classification of transit system with example. (08 Marks)
   b. Write a note on the following :
     (i) BRTS
     (ii) Metro trains (08 Marks)

Module-2

3 a. Define external cordon line. What factors should be given due weightage in the selection of external cordon line. (06 Marks)
   b. What is zoning? Discuss the points to be kept in mind while doing zoning. (10 Marks)

OR

4 a. What are the methods of origin and destination study? Explain home interview method in detail. (08 Marks)
   b. What is sampling? Discuss various types of samplings. (08 Marks)

Module-3

5 a. Explain in detail the factors governing trip generation and attraction rates. (06 Marks)
   b. The following data shows average household size and total trips made per day for a particular zone of study area. Develop the trip production equation and also compute co-efficient of correlation. (10 Marks)

Average Household size	Total trips/day
2	4
3	6
4	7
5	8
6	10

OR

6 a. Enlist the different methods of trip distribution. Explain in detail average growth factor method. **(06 Marks)**

b. Estimate the future trip distribution by Furness method (up-to two iteration) from the following data: **(10 Marks)**

O/D	1	2	3	4	Future trips
1	-	50	60	30	280
2	40	-	70	20	390
3	20	60	-	40	300
4	50	70	30	-	220
Future trips	200	500	340	150	

Module-4

7 a. Write a short note on opportunity models. **(06 Marks)**

b. The total trips produced in and attracted to the three zones A, B and C of a survey area in the design year area tabulated as

Zone	Trips Produced	Trips attracted
A	2000	3500
B	3500	4800
C	4800	2000

It is known that the trips between two zones are inversely proportional to the second power of the travel time between zones, which is 25 minutes. If the trip interchange between zones B and C is 300. Calculate the trip interchange between zones A and B, A and C, B and A, C and B. **(10 Marks)**

OR

8 a. Define modal split and explain in brief the factors affecting modal split. **(10 Marks)**

b. Draw the flow diagram for modal split carried out between trip generation and trip distribution. **(06 Marks)**

Module-5

9 a. List the various assignment techniques and explain any two methods. **(10 Marks)**

b. Explain the application of the traffic assignment. **(06 Marks)**

OR

10 a. Discuss the points for the selection of land - use transport model. **(06 Marks)**

b. Write a flow chart of fundamental structure of Lowry model and explain the principal components of the model. **(10 Marks)**

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