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15CV71

Seventh Semester B.E. Degree Examination, June/July 2019
Municipal and Industrial Waste Water Engineering

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Any missing data can be assumed.*

Module-1

- 1 a. Define sanitation. Mention advantages and disadvantages of different methods of sewage disposal. (08 Marks)
 b. Name different types of sewage system with their advantages and disadvantages. (08 Marks)

OR

- 2 a. With sketch explain shapes of sewers. (08 Marks)
 b. Draw a neat plan showing house drainage connections with labeling parts. (08 Marks)

Module-2

- 3 a. What is self purification of stream? With sketch, explain oxygen sag curve. (08 Marks)
 b. With sketch explain zones of purification. (08 Marks)

OR

- 4 a. What is sewage sickness? Mention methods used to prevention of sewage sickness? (08 Marks)
 b. A wastewater effluent of 560 l/sec with BOD = 50 mg/l, dissolved oxygen = 3.0 mg/l and temperature of 23°C enters a river where the flow is 28 m³/sec and BOD = 4.0 mg/l, D.O = 8.2 mg/l and temperature is 17°C. K₁ of the waste is 0.1 per day at 20°C. The velocity of water in the river downstream is 0.18 meter/sec and depth of 1.20 mts. Determine following after mixing of waste water with the river (i) Combined discharge (ii) BOD (iii) D.O (iv) Temperature. (08 Marks)

Module-3

- 5 a. Draw a flow diagram of municipal waste water treatment plant with their operation units. (08 Marks)
 b. Briefly explain characteristics of domestic waste water. (08 Marks)

OR

- 6 a. List the difference between activated sludge process and trickling filters. (08 Marks)
 b. With sketch explain grit chamber and skimming tank. (08 Marks)

Module-4

- 7 a. Mention the differences between domestic waste water and industrial waste water. (08 Marks)
 b. Write note on:
 i) Volume reduction
 ii) Strength reduction
 iii) Neutralization
 iv) Equalization (08 Marks)

OR

- 8 a. What are the merits and demerits of municipal and industrial waste water combined treatment methods. (08 Marks)
- b. Briefly explain methods used to removal of organic and inorganic salts from waste water. (08 Marks)

Module-5

- 9 a. Explain with flow diagram, treatment option for distilleries plant. (08 Marks)
- b. With the help of flow chart, mention sources and characteristics of waste water from tannery. (08 Marks)

OR

- 10 a. Explain with flow diagram, treatment option for sugar mills. (08 Marks)
- b. With the help of flow chart, mention sources and characteristics of waste water from pharmaceutical industry. (08 Marks)

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15CV72

Seventh Semester B.E. Degree Examination, June/July 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 IS456, IS800, IS3370, SP(6)-steel tables is permitted.
3. Any missing data may be assumed suitably.*

Module - 1

- 1 a. Name the different types of retaining walls. (04 Marks)
b. Design a combined footing for two interior columns carrying axial loads 1000kN and 1200kN. Column A is 400mm × 400mm in size and column B is 450mm in diameter. They are reinforced with 20mm bars and are spaced 4m centre to centre as for a bearing capacity of the soil is 120 kN/m². Use M20 mix and Fe 415 grade steel. Sketch it. (36 Marks)

OR

- 2 a. Name the different classification of liquid retaining structures. (04 Marks)
b. Roof of a 8m wide hall is supported on a portal frame spaced at 4m intervals. The height of the portal frame is 4m. The continuous slab is 120mm thick. Live load of roof is 1.5 kN/m², SBC of soil is 150 kN/m². The columns are connected with a plinth beam and the base of the column may be assumed fixed. Design the slab, column, beam members for the columns of the portal frame. Use M20 and Fe415 grade steel. Sketch the details. (36 Marks)

Module - 2

- 3 a. Name any 4 various types of roof trusses. (04 Marks)
b. Design a welded plate girder for an effective span of 20m to support a Udl of 80 kN/m in addition to a pair of point loads of 870 kN each of 5m from end of beam (10m apart @ center). Design the plate girder. (36 Marks)

OR

- 4 a. What are the advantages of plate girder over trusses? (04 Marks)
b. Design a simply supported crane girder for the following data. The girder is electrically operated. Take yield stress of steel as 250MPa.
i) Span of the crane girder = 20m
ii) Span of the gantry girder = 7m
iii) Capacity of the crane = 250kN
iv) Self weight of crane excluding crab = 200kN
v) Weight of crab = 60kN
vi) Wheel base distance = 3.4m
vii) Minimum hook approach = 1.1m
viii) Self weight of rail = 0.3 kN/m
ix) Height of rail = 75mm. (36 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

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Seventh Semester B.E. Degree Examination, June/July 2019 Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define precipitation. Explain various forms of precipitation. (05 Marks)
b. Explain with a neat sketch, Symon's rain gauge. (06 Marks)
c. Rain gauge station 'X' did not function for a part of a month during which a storm occurred. The storm produced rain fall of 84, 70 and 96 mm at three surrounding station's A, B and C respectively. The normal annual rainfalls at the stations X, A, B and C are respectively 770, 882, 736 and 944 mm. Estimate the missing rainfall at station X. (05 Marks)

OR

- 2 a. Explain Horton's engineering representation of hydrologic cycle, with a neat sketch. (08 Marks)
b. Describe double mass curve techniques used to check consistency of rainfall data and adjust rainfall records. (08 Marks)

Module-2

- 3 a. Define evaporation, with a neat sketch, explain measurement of evaporation using ISI standard pan. (08 Marks)
b. Distinguish between the potential and actual evapotranspiration. (04 Marks)
c. Explain the factors affecting infiltration capacity. (04 Marks)

OR

- 4 a. Explain how the evapotranspiration can be estimated using the Blaney – Criddle method. (05 Marks)
b. With the neat sketch, explain double ring infiltrometer. (05 Marks)
c. A seven hour storm produced the following rainfall intensities (in mm/hr) at half an hour interval over a basin of area 1830 km².
4, 9, 20, 18, 13, 11, 12, 2, 8, 16, 17, 13, 6 and 1
If the corresponding observed run off is 36.6 million m³, estimate the ϕ – index for the storm. (06 Marks)

Module-3

- 5 a. Define runoff. Enlist the factors affecting runoff. (04 Marks)
b. Describe any two methods of separating the base flow from total runoff. (04 Marks)
c. The ordinates of 4h UH in m³/sec is given at a time interval of 2h after separating from the base flow :
0, 12.52, 21.32, 23.54, 17.84, 14.79, 12.18, 10.04,
8.26, 6.51, 4.98, 3.95, 3.05, 2.26, 1.60, 1.07, 0.53, 0
Derive the 8h unit hydrograph. (08 Marks)

OR

- 6 a. Define unit hydrograph. What are the assumptions underlying the unit hydrograph theory? How do they limit the applicability of unit hydrograph? (08 Marks)
- b. Given below are the ordinates of a 4h unit hydrograph of a basin in m^3/sec at one hour intervals :
4, 25, 44, 60, 70, 61, 52, 45, 38, 32, 27, 22, 18, 14, 11, 8, 6, 4, 2, 1
Construct the s-curve hydrograph using the 4h UH. Hence derive the 2 hour unit hydrograph. Area of the basin is 195.84 km^2 . (08 Marks)

Module-4

- 7 a. Define the term irrigation. Briefly describe the factors which necessitate the irrigation. (04 Marks)
- b. Write a note on : flow and lift irrigation. (04 Marks)
- c. Explain in detail irrigation efficiency and add a note on crop seasons of India. (08 Marks)

OR

- 8 a. Define : duty, delta and base period. Derive the relationship between them. (05 Marks)
- b. Write a note on Bandhora irrigation. (03 Marks)
- c. A water course has culturable commanded area of 2600 hectares, out of which the intensities of irrigation for perennial sugar – cane and rice crops are 20% and 40% respectively. The duty for these crops at the head of water course are 750 hectares/cumes and 1800 hectares/cumes respectively. Find the discharge required at the head of water course if the peak demand is 120% of the average requirement. (08 Marks)

Module-5

- 9 a. Define canal. Explain different types of canal based on alignment. (08 Marks)
- b. What is meant by design of canal? Bring out the difference between Kennedy's and lacey's theory. (08 Marks)

OR

- 10 a. With a neat sketch, explain zones of storage in a reservoir. (08 Marks)
- b. A channel section has to be designed for the following data :
Discharge $Q = 30$ cumes
Silt factor $f = 1.00$
Side slope $= \frac{1}{2} : 1$
Find also the longitudinal slope. (08 Marks)

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15CV741

Seventh Semester B.E. Degree Examination, June/July 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 IRC:21-2000 allowed.
3. Assume any missing data suitably.

Module-1

- 1 a. Explain linear waterway, afflux and scour. (06 Marks)
b. Determine the water way for a bridge across a stream with a flood discharge of $225 \text{ m}^3/\text{s}$, velocity 1.5 m/s and width of flow at high flood level 60 m , if allowable velocity under the bridge is 1.8 m/s . Use Molesworth formula. (10 Marks)

OR

- 2 a. Derive an expression for economic span of a bridge. (08 Marks)
b. Briefly explain class AA wheeled vehicle with a neat sketch. (08 Marks)

Module-2

- 3 Design a slab bridge for the following details:
Loading = class AA tracked vehicle
Clear span = 4.5 m
Road width = 7.5 m
Foot path on either side = 600 mm
Thickness of wearing course = 80 mm
For M25 concrete and Fe415 steel
 $k_d = 0.318 d$, $j_d = 0.89d$
Constant $\alpha = 2.85$
Density of concrete = 24 kN/m^3
Density of wearing course = 22 kN/m^3
Check for shear not required and no need to design the footpath. Show reinforcement details in a cross section. (16 Marks)

OR

- 4 Design a slab bridge for the following details:
Carriage way width = 12 m
Kerb width = 550 mm
Exposure condition = moderate
M25 concrete and Fe 415 steel
Loading = class AA wheeled vehicle
Clear span = 5.0 m ; $\alpha = 3.0$
Wearing course = 60 mm
Check for shear not required. No need to design Kerb. Show reinforcement details. (16 Marks)

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Module-3

- 5 A T-Beam bridge has to be provided across a channel having following data. Design the slab deck and show reinforcement details.
 Food discharge = $30 \text{ m}^3/\text{s}$
 Bed width = 12 m
 Side slope = 1:1
 Depth of flow = 1.25 m
 Maximum allowable afflux = 1.50 cm
 Number of longitudinal girders = 3
 Load = IRC class AA tracked vehicle on a two lane highway of 7.5 m
 M25 concrete and Fe415 steel, $k_d = 0.318 d$, $j_d = 0.89 d$.
 Thickness of wearing course = 80 mm
 Take $m_1 = 0.043$ and $m_2 = 0.028$ for self weight of slab and surface finish. Take $m_1 = 0.077$ and $m_2 = 0.058$ for live load. No need to check for shear. (16 Marks)

OR

- 6 A T-beam bridge has to be provided across a channel having following data. Design the T-beam and show reinforcement details.
 Clear span = 14 m
 Number of longitudinal girders = 3
 Spacing of girders = 3 m
 Width of main girder = 0.30 m
 Spacing of cross girders = 3.5 m
 Width of cross girder = 0.25 m
 M25 concrete and Fe415 steel = $k_d = 0.318 d$, $j_d = 0.89 d$
 Load = IRC class AA tracked vehicle on a two lane highway of 7.5 m
 Footpath = 1 m wide footpath on either side
 Thickness of wearing course = 80 mm
 Take impact = 10%
 Overall depth = 1450 mm
 Reaction coefficient for the critical girder due to live load = 0.517 (16 Marks)

Module-4

- 7 An RCC pipe culvert is proposed for a drain carrying a design discharge of $1.40 \text{ m}^3/\text{s}$. Permissible velocity of flow is 1.50 m/s. Bed level of drain 100.00 m, road formation level 103.00 m, road width is 7.50 m. Embankment slope is 1.5:1. Table below gives the details of NP3 pipe and its strength.

Pipe diameter		Reinforcement		Three edge bearing strength
Internal	External	Longitudinal	Spiral	
800 mm	990 mm	26.60 N/m	130.40 N/m	57.48 kN/m

Embankment load is 60 kN/m. Value of $C_s = 0.025$ for IRC class AA wheel load of 62.50 kN. Impact factor is 1.50. Coefficient of head loss at entry is 0.51. Coefficient of head loss due to friction is $0.0033 L/(R)^{1.3}$. Design the pipe culvert. Draw the cross section of pipe showing reinforcement and bedding details. (16 Marks)

OR

- 8 Design a box culvert having inside dimensions of $3.5\text{m} \times 3.5\text{m}$. The culvert is subjected to a super imposed dead load of 12 kN/m^2 and a live load of 35.7 kN/m^2 including impact. Unit weight of soil = 18 kN/m^3 . The coefficient of active earth pressure, $k_a = 1/3$. $k = 0.318$ and $j = 0.89$ for M25 concrete and Fe415 steel. The design condition is the top of the slab carries the dead and live loads and the culvert is empty. Take road width equal to 7.5 m. (16 Marks)

Module-5

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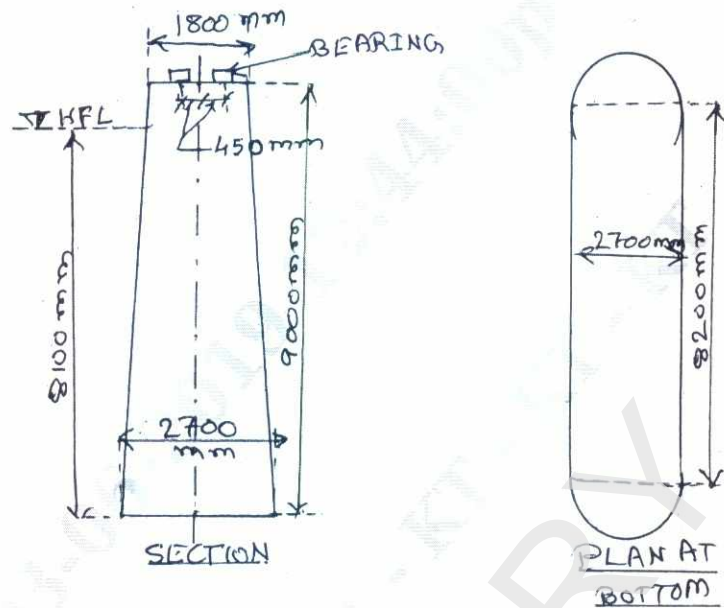


Fig.Q9

Check the adequacy of dimensions of the pier shown in Fig.Q9 for the following details.

Super structure = simply supported T-beam of 21.30 m span

Foundation = well foundation

Dead load from each span = 2250 kN

Reaction due to live load on one span = 900 kN

Maximum mean velocity of current = 3.6 m/s

Materials for pier : M20 grade concrete

Live load = IRC class AA tracked vehicle

(16 Marks)

OR

10 a. Explain with a neat sketch the following two types of bearings:

i) Fixed bearing

ii) Expansion bearing

(08 Marks)

b. What are the functions of an expansion joint? Explain it briefly with any two neat sketches.

(08 Marks)

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15CV751

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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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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