

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017**DESIGN AND DRAWING OF STEEL STRUCTURES**

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 800-2007 and Structural (steel) tables are allowed. For all designs adopt Limit State Method

PART –A

- 1 Design a simply supported gantry girder to carry an electric overhead travelling crane for the following data: [28M]
- | | |
|----------------------------------|--------|
| Crane capacity | 320kN |
| Weight of crane and crab | 300kN |
| Weight of crane | 200kN |
| Minimum approach of crane hook | 1.20m |
| Distance between c/c of wheels | 3.20m |
| Distance between c/c of gantries | 16.0m |
| Span of gantry girder | 4.00m |
| Weight of rails | 300N/m |
| Height of rails | 75mm |
| Yield stress of steel | 280MPa |
- Draw to scale i) the cross-section, ii) the longitudinal section.
- 2 Design a beam of 5m effective span, carrying a uniform load of 20kN/m if the compression flange is laterally unsupported. And also check for deflection and shear. Draw to scale i) the cross-section, ii) the longitudinal section and iii) plan. [28M]

PART –B

- 3 A column section ISHB@577N/m is carrying a factored axial load of 600kN, a factored moment of 30kN and a factored shear force of 60kN. Design a suitable column splice. Assume ends are milled. [14M]
- 4 Design a slab base for a column ISHB 300@0.588kN/m carrying a load of 1000kN. It is supported on concrete pedestal having bearing capacity of 4N/mm². [14M]
- 5 Design a tension member 3.4m between c/c of intersections and carrying a pull of 145kN, the member is subjected to reversal of stresses. [14M]
- 6 Design a welded plate girder of span 30m. It is subjected to a uniformly distributed load of 32kN/m. use the steel with yield stress 250MPa. [14M]
- 7 Determine the basic wind pressure to be considered for a shed in the outskirts of Bangalore. Given: [14M]
 Structure: General purpose with probable life of 50 years
 Terrain category: I, Building class: B
 Eve's board height: 11 m
 Topography: Plain Area.

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Use of IS: 800-2007 and Structural (steel) tables are allowed. For all designs adopt Limit State Method

PART – A

- 1 Design as.s gantry girder to carry one electric over head travelling crane. [28M]

Span of gantry girder	6.5m
Crane capacity	250kN
Span of crane girder	16m
Self weight of crane girder excluding trolley	200kN

Draw to scale i) the cross-section, ii) the longitudinal section.

- 2 Design a gusseted base for a column section ISHB 350@724N/m subjected to an axial load of 3500kN. The base rests on a M15 concrete pedestal. The safe bearing pressure of concrete may be assumed to be 4N/mm^2 . Draw to scale the plan and elevation. [28M]

PART – B

- 3 Design a tension member 3.6m between c/c on intersections and carrying a pull of 146kN. The member is subjected to reversal of stresses. [14M]
- 4 Explain various components of roof trusses with neat sketches in brief. [14M]
- 5 Design a simply supported beam of span 4m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 20kN/m imposed load and 20kN/m dead load. Assume fe 410 grade steel. [14M]
- 6 A column section ISHB 450@ 872kN/m is to be spliced with a column ISHB 300 @ 588N/m. The load on the column is 600kN. Design a suitable splice. [14M]
- 7 Design a welded plate girder 24m in effective span and simply supported at the two ends. It carries a uniformly distributed load of 100kN/m. [14M]

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 (Civil Engineering)

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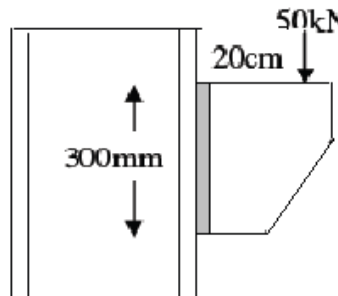
Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 800-2007 and Structural (steel) tables are allowed. For all designs adopt Limit State Method

PART -A

- 1 A riveted Plate Girder with a superimposed load of 100 kN/m for an effective span of 20 m. Assume girder is to be laterally supported through. Steel is of grade $f_y=250$ MPa. Assume 4-unequal angle sections and available thickness of plates are 12 mm and 16 mm. Design the cross-section of the girder and the bearing stiffener. Draw the cross-section, sectional elevation including bearing stiffener details to a suitable scale. [28M]
- 2 Design a built-up column 7 m long to carry a factored axial load of 1000 kN. The column is restrained in position but not in direction at both the ends. Design the column with two channels placed toe-to-toe. Provide single lacing system with **welded** connection. Assume Fe 410 grade. Draw to scale the cross-section and sectional elevation of the column. [28M]

PART -B

- 3 a) Write about the methods for inspecting welds. [5M]
- b) Determine the depth of the fillet weld required to join a plate bracket with flange of a stanchion as shown in figure (Load = 50 kN) [9M]



- 4 Design a suitable rolled steel joist for a roof of a hall 7.5 m x 12 m consists of 100 mm thick RC slab supported on steel beams spaced at 3 m apart. The finishing may be taken as 1 kN/m^2 and live load is taken as 4 kN/m^2 . Self-weight of beam is taken as 1 kN/m^2 . Take limiting deflection = span/250. [14M]
- 5 Design a channel section purlin on a sloping roof truss with the dead load of 0.20 kN/m^2 and a live load of 2 kN/m^2 and also a wind load of 1.5 kN/m^2 . The purlins are spaced 2 m apart and of span 4 m c/c, simply supported on a rafter at a slope 20 degrees. [14M]
- 6 a) Write about different types of tension members.
- b) Design a tension member to carry a load of 280 kN. The two angles placed back to back with long legs out standing are desirable. The length of the member is 2.9m.
- 7 A column of 6 m effective length is carrying an axial load of 400 kN and a bending moment of 50 kN-m. The bearing pressure from the concrete pedestal may be taken as 4000 N/m^2 . Design a suitable base plate. [14M]

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III B. Tech II Semester Regular/Supplementary Examinations, April- 2017

ENVIRONMENTAL ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART –A

- 1 a) Write a short note on various methods of estimating fire demand. [3M]
 b) Compare ground water sources and surface water sources with reference to their quality and quantity. [4M]
 c) Give the desirable limits and permissible limits in the absence of other source for the following water quality parameters as per IS 10500 1991: [4M]
 i) Turbidity ii) Fluorides iii) Nitrates and iv) Sulphates
 d) Draw flow chart of water treatment plant for highly turbid river water. [3M]
 e) Explain with relevant equations, how chlorine acts as a disinfectant? [4M]
 f) What are the requirements of good water meters? [4M]

PART –B

- 2 a) What is meant by design period of a water supply scheme? Discuss various factors affecting design period. [6M]
 b) Predict the population for the year 2021 and 2031 using the following data by geometrical increase method and incremental increase method. [10M]

Census Year	Population
1951	21,000
1961	22,800
1971	30,000
1981	42,000
1991	50,000
2001	55,500

- 3 a) Explain the stepwise procedure to determine the reservoir capacity using mass curve technique. [8M]
 b) Explain canal intake with neat diagram. Mention important design features. [8M]
- 4 a) Explain EDTA method for the determination total, permanent and temporary hardness of water. Give the relevant chemical equations. [6M]
 b) Explain how do you conduct the following tests to detect the presence of coliform group: [10M]
 i) Presumptive test ii) Confirmed test iii) Completed test
- 5 a) Explain with relevant chemical equations, how alum acts as coagulant. What are the advantage and disadvantages of alum? [8M]
 b) Design slow sand filter beds for 50,000 population with an average per capita supply of 200 lpcd. Assume relevant data required. Keep one unit as stand by. [8M]

- 6 a) Explain with relevant chemical equations, Lime-Soda process for softening of hard water. What are the advantages and disadvantages of this process? [10M]
b) Describe the following methods of disinfection and mention their advantages and disadvantages: [6M]
i) Ozonation ii) UV-radiation
- 7 a) Explain stepwise procedure for the analysis of complex water distribution networks using Hardy-cross method. Derive expression for correction term. [10M]
b) Write short notes on: i) Sluice valve and ii) Check valve [6M]

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017

ENVIRONMENTAL ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. Answering the question in **Part-A** is compulsory

3. Answer any **THREE** Questions from **Part-B**

PART –A

- 1 a) Briefly discuss any four factors affecting design period of a water supply scheme. [4M]
- b) Define gravity conduits and pressure conduits. What are the advantages of pressure conduits over gravity conduits? [3M]
- c) The measured pH values of incoming and outgoing waters at a water treatment plant are 7.5 and 8.8 respectively. Determine the average pH of water, assuming linear variation of pH with time. [4M]
- d) Explain the principle of coagulation. [3M]
- e) What are the purposes served by aeration? List any four methods of aeration. [4M]
- f) Explain any one type of fire hydrant with a neat diagram. [4M]

PART –B

- 2 a) Explain various factors that affect per capita water consumption of a city. [8M]
- b) Estimate the probable population of a city for the years 2021 and 2031 by Arithmetic Increase method from the following census data. [8M]

Census Year	Population
1951	35,000
1961	42,700
1971	48,800
1981	60,000
1991	72,800
2001	88,500

- 3 a) Draw a neat diagram of a river intake structure. Explain the salient features. [8M]
- b) The yield of water from a catchment area during each successive month is given below. Determine the minimum capacity of a reservoir required to allow the above volume of water to be drawn off at a uniform rate assuming that there is no loss of water over the spillway. [8M]

Month	Inflow (M.cu.m)	Month	Inflow (M.cu.m)
January	1.5	July	8.4
February	2.2	August	5.6
March	3.0	September	2.3
April	8.9	October	2.0
May	12.0	November	1.8
June	11.8	December	1.2

- 4 a) Explain in detailed the procedure for determination of MPN index of a water sample. [10M]
b) What are the sources and effects of the following water quality parameters? [6M]
i) Turbidity ii) Fluorides and iii) Hardness
- 5 a) 4 MLD of water per day passes through a sedimentation tank basin which is 6 m wide, 16 m long and 3.5 m deep. (i) Find the detention time for this basin (ii) Determine the average velocity of flow through the basin (iii) Compute the SOR of the basin. [8M]
b) Distinguish between slow sand filters and rapid gravity filters. [8M]
- 6 a) Explain Zeolite process for water softening. Enumerate its advantages and disadvantages. [10M]
b) Explain various methods of defluoridation. [6M]
- 7 a) Describe with neat diagrams various layouts of distribution. Mention the applicability of each method. [8M]
b) What are the requirements of a good water meter. Explain any one type of water meter with a neat sketch. [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017

ENVIRONMENTAL ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. Answering the question in **Part-A** is compulsory

3. Answer any **THREE** Questions from **Part-B**

PART –A

- 1 a) Discuss the role of environmental engineer in protecting public health and improving quality of life of the society. [4M]
- b) What are tube wells and bore wells? Compare the quality and quantity of water obtained from these sources. [3M]
- c) Give the desirable limits for the physical parameters of drinking water as per IS 10500 -1991. [4M]
- d) What are the advantages and disadvantages of using alum as coagulant? [3M]
- e) With a neat diagram explain break point chlorination curve. [4M]
- f) What are gravity system and combined gravity and pumping system of water distribution? What are the advantages of combined system? [4M]

PART –B

- 2 a) Draw the flow chart of public water supply scheme. [4M]
- b) The population of the past three successive decades of a city is given below. Estimate the population of the city for the year 2021 by decreasing rate of growth method. [8M]

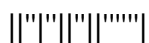
Census year	Population
1981	47050
1991	54500
2001	61000

- c) Write a short note on variations in rate of demand of water. [4M]
- 3 a) Explain various factors governing the selection of a suitable site for the location of an intake structure. [8M]
- b) A pipe line 0.8 m diameter is 1.5 km long. To augment the discharge, another pipe line of same diameter is introduced in parallel to the first in the second half of its length. Find the increase in discharge. The difference of head between inlet and outlet of the pipe line is 35 m. Use Darcy-Weisbach formula with $f = 0.04$. [8M]
- 4 a) Explain the following methods for ascertaining bacteriological quality of water. [8M]
 - i) Total count test and ii) Membrane filter technique. What are the advantages of membrane filter technique?
- b) What are the disadvantages of excess hard water when supplied for industrial purpose? [4M]
- c) Find out the pH of a mixture formed by mixing the following two solutions: [4M]

Solution A: Volume = 300 ml and pH = 7

Solution B: Volume = 700 ml and pH = 6

- 5 a) Define optimum dosage of coagulant. Explain jar test for the determination of optimum dosage of coagulant. [8M]
b) Draw a neat diagram of rapid sand filter and explain how the backwashing operation is carried out. [8M]
- 6 a) Calculate the quantity of bleaching powder required per year for disinfecting 6 million litres of water per day. The dose of chlorine has to be 0.35 ppm and the bleaching powder contains 35% of available chlorine. [5M]
b) Explain the following: [8M]
i) Removal of colour, odour and taste by Activated carbon
ii) Removal of iron and manganese
c) What do you understand by the term residual chlorine? Explain its significance in water supply scheme? [3M]
- 7 a) Describe with neat diagrams various layouts of distribution. Mention the applicability of each method. [8M]
b) Write short notes on: [8M]
i) Requirements of a good distribution system
ii) Equivalent pipe method



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ENVIRONMENTAL ENGINEERING – I
 (Civil Engineering)

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART –A

- 1 a) Write a short note on waterborne diseases caused by bacteria and inorganic matter. [4M]
- b) Draw a neat diagram of canal intake. [4M]
- c) Write down the permissible limits for the following parameters as per IS 10500-1991 for drinking water: [4M]
 i) Chlorides ii) Total Dissolved Solids iii) pH and iv) Phenolic compounds
- d) Define Surface Over Flow rate and Detention period for a continuous flow sedimentation tank. Give the range of values normally adopted in the design for the above two parameters. [3M]
- e) What do you understand by Chlorine Demand and Free Residual Chlorine? What is the importance of residual chlorine [4M]
- f) Write a short note on pressure in distribution layouts. [3M]

PART –B

- 2 a) For a city of 1,00,000 population and an average water supply of 200 lpcd, calculate fire demand by using various equations and IS code provisions. Also determine the coincident draft. [7M]
- b) What is meant by per capita demand and design period? Discuss various factors which affect per capita consumption of water. [9M]
- 3 a) Explain various surface and sub-surface water sources with reference to available quantity and quality of water. [8M]
- b) Explain stepwise procedure to determine the capacity of storage reservoir by using mass curve method. [8M]
- 4 a) Explain the following tests used for the bacteriological analysis of the given water sample: [10M]
 i) Presumptive test ii) Confirmed test and iii) Completed test
- b) The analysis of water from a well showed the following results in mg/L: [6M]
 $Ca^{++} = 65$, $Mg^{++} = 51$, $Na^{+} = 101.5$, $K^{+} = 21.5$
 $HCO_3^{-} = 248$, $SO_4^{-} = 221.8$, $Cl^{-} = 79.2$
 Find the total hardness, carbonate hardness and non-carbonate hardness.

- 5 a) Derive an expression for the determination of settling velocity of discrete particles. [8M]
b) Design rapid sand filters beds for treating water required for a population of 1,50,000 people with an average rate of demand of 150 lpcd with the following data: [8M]
i) Filter area of each unit should not be more than 50 m^2
ii) Amount of water used for back-washing is 4% of treated water per day
iii) The time required for back washing may be neglected
iv) One unit must be kept as stand by.
Assume any other data required.
- 6 a) Explain zeolite method for water softening. Mention the advantages and drawbacks of this method. [8M]
b) Write short notes on: [8M]
i) Nalgonda Technique for defluoridation
ii) Break point chlorination
iii) Aeration
- 7 a) Explain stepwise procedure for the analysis of complex water distribution networks by using Hardy-cross method. Derive expression for correction term. [10M]
b) Write short notes on: i) Air relief valve ii) reflex valve and iii) scour valve [6M]

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL POLLUTION AND CONTROL
(Civil Engineering)

Time: 3 hours

Maximum Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- | | | | |
|---|----|--|------|
| 1 | a) | Enumerate the various methods of controlling gaseous emission. | [4M] |
| | b) | State the significance of recirculation of wastes. | [3M] |
| | c) | What are the various characteristics of solid wastes? | [4M] |
| | d) | List out the rural sanitation methods for hospitals. | [3M] |
| | e) | Classify the various hazardous wastes. | [4M] |
| | f) | Discuss the various factors governing the sustainable development. | [4M] |

PART -B

- | | | | |
|---|----|---|------|
| 2 | a) | As per IS: 14000 codal provisions, discuss the ways of reducing the industrial noise and pollution. | [8M] |
| | b) | Discuss various causes, effects and control measures of Air Pollution. | [8M] |
| 3 | a) | Explain the salient features of Neutralization. | [5M] |
| | b) | What are the various Treatment units provided for industrial wastewater treatment? Explain each with a neat sketch. | [8M] |
| | c) | State the sources of Industrial wastewater. | [3M] |
| 4 | a) | Give the detailed structure of Municipal solid waste and explain each in accordance to the present day scenario. | [8M] |
| | b) | Discuss the sources, causes and effects of waste on health. | [8M] |
| 5 | a) | Write a detailed note on the characteristics and effects of waste from social gatherings. | [8M] |
| | b) | Highlight the detailed classification of Sanitation system. | [8M] |
| 6 | a) | By means of neat sketch, explain in about Landfill process of Hazardous Waste. | [8M] |
| | b) | Discuss the various principles and strategies followed for Hazardous waste management. | [8M] |
| 7 | a) | Explain how the barriers and strategies help to achieve sustainable development with any suitable examples. | [8M] |
| | b) | Discuss in detail about various components and elements of Sustainable development | |

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL POLLUTION AND CONTROL
(Civil Engineering)

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What are the various causes of Air pollution? [3M]
- b) State the significance of proportioning in Industrial wastewater management. [4M]
- c) Enlist the basic characteristics of solid waste management. [4M]
- d) Enumerate the objectives of Environmental Sanitation. [4M]
- e) What are the various control methods followed by Hazardous waste. [3M]
- f) State the indicators of Sustainable development. [3M]

PART -B

- 2 a) Discuss in detail about the sources, effects and control measures of Noise Pollution. [8M]
- b) Explain any two methods of controlling Gaseous Emissions. [8M]
- 3 a) Explain the ways of strength reduction of industrial wastewater in detail. [3M]
- b) What is Neutralization? Explain various methods of the same [8M]
- c) Enlist the various strategies to be followed for pollution control. [5M]
- 4 a) In the present day scenario, explain the importance of solid waste management. [6M]
- b) Explain in detail the various processes carried out during the solid waste management. [10M]
- 5 a) List out the various components of Environmental Sanitation and explain any two in detail. [10M]
- b) Discuss the types and characteristics of Refuse Disposal. [6M]
- 6 a) Enumerate the sources and effects of Nuclear Wastes. [8M]
- b) Discuss the characteristics and treatment methods followed for Chemical wastes. [8M]
- 7 a) Define Sustainable development and highlight the nature and consequence of Environmental sustainability. [8M]
- b) Differentiate between Development and Sustainable development. [8M]

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ENVIRONMENTAL POLLUTION AND CONTROL
(Civil Engineering)

Time: 3 hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Highlight the effects of Noise Pollution. [3M]
- b) List the standard range of some important effluents of Industrial wastewater. [4M]
- c) State the necessity of solid waste management. [4M]
- d) Enlist the various methods of Excreta Disposal and explain any one method. [5M]
- e) Differentiate between the characteristics of Biomedical and Chemical wastes. [3M]
- f) Define Economic Sustainability as a pillar to sustainable development. [3M]

PART -B

- 2 a) Explain the principle involved in the analysis of any two Air Pollution devices. [8M]
- b) Along with the respective equations, discuss how do you estimate the cycle time of noise pollution, speed and sound pressure levels. [8M]
- 3 a) Explain the various characteristics of industrial wastewater. [8M]
- b) State the significance and working principle of Equalization tanks with a neat sketch. [8M]
- 4 a) Describe the various environmental benefits achieved because of solid waste management. [8M]
- b) State and explain about the hierarchy of solid waste management. [8M]
- 5 a) Enumerate the characteristics of wastewater coming from Schools and Institutions. [8M]
- b) Discuss in detail about any two low cost sanitation methods. [8M]
- 6 a) Explain in brief about management techniques and expertise required for the treatment of Hazardous wastes. [8M]
- b) Highlight the impacts due to disposal of electronic wastes to the climatic conditions. [8M]
- 7 a) By means of an example explain how cleaner production can be achieved by attaining sustainable development. [8M]
- b) What is the change that is expected in sustainable development through Industrialization? Explain. [8M]

Code No: RT32016A

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SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL POLLUTION AND CONTROL
(Civil Engineering)

Time: 3 hours

Maximum Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Enlist the various measurement methods of Noise Pollution along with the standards. [4M]
- b) Highlight few strategies to be followed to control industrial wastewater pollution. [4M]
- c) State the fundamentals of land filling. [4M]
- d) Define Sanitation and Sanitation System. [4M]
- e) In what way is the Hazardous waste management important in the present day scenario? [3M]
- f) What do you understand about sociopolitical sustainability? [3M]

PART -B

- 2 a) Explain in detail about the various Particulate control devices. [8M]
- b) As per IS codal provisions, list the various Noise standards. [4M]
- c) What are the various causes and effects of Gaseous emissions? Explain. [4M]
- 3 a) Explain the uses, advantages and limitations of Equalization Tanks. [5M]
- b) Discuss in detail about Recirculation and Proportioning of Industrial wastes. [8M]
- c) How Volume and Strength reduction does contributes towards industrial wastewater management? [3M]
- 4 a) According to EPA regulations, define the solid wastes and give the detailed classification of wastes. [8M]
- b) Describe any two methods of solid waste disposal along with neat sketches [8M]
- 5 a) Give the detailed classification and suitability of Sanitation System. [8M]
- b) Explain about any two Environmental sanitation methods adopted for Swimming pools and public bathing places. [8M]
- 6 a) Show and differentiate in the form of a tabular column the important characteristics of Nuclear, Chemical and Electronic wastes. [8M]
- b) Give the details of the treatment process followed for Biomedical wastes. [8M]
- 7 a) Explain the various ways of home sustainability as a part of sustainable development. [8M]
- b) Discuss in detail about the approaches and strategies of Sustainable development. [8M]

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III B. Tech II Semester Regular/Supplementary Examinations, April- 2017

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) How do you decide the number of boreholes to be made in the soil investigation? [3M]
 b) Define infinite and finite earth slopes. [4M]
 c) Discuss the factors affecting bearing capacity of shallow foundations. [4M]
 d) List the causes and effects of settlement. [4M]
 e) What are the methods for the installation of piles? Discuss briefly. [3M]
 f) Briefly explain the construction procedure of floating caisson. [4M]

PART -B

- 2 a) What are the different corrections to be made to SPT field values? [4M]
 b) Discuss about methods of Boring. [8M]
 c) Describe split spoon sampler. [4M]
- 3 a) Explain the Culmann's graphical method. [8M]
 b) Discuss the uses of stability charts. A cutting of depth 10 m is to be made in soil which has $c = 30 \text{ kN/m}^2$, $\gamma = 19 \text{ kN/m}^3$ and $\phi = 0$. There is a hard stratum below the original soil surface at a depth of 12 m. Find the safe slope of cutting if the factor of safety is 1.5. For $D_f = 1.20$; $S_n = 0.143$ for $i = 30^\circ$; $S_n = 0.101$ for $i = 15^\circ$. [8M]
- 4 a) Explain different types of shear failures of soil with neat sketch. [6M]
 b) Compute the safe bearing capacity of a continuous footing 1.5 m wide, at a depth of 1.5 m, in a soil with $\gamma = 18 \text{ kN/m}^3$, $c = 18 \text{ kN/m}^2$, and $\phi = 25^\circ$. Terzaghi's factors of $\phi = 25^\circ$ are $N_c = 25$, $N_q = 12.5$, and $N_\gamma = 10$. What is the safe load per metre run if the factor of safety is 3? [10M]
- 5 a) Describe the procedure to conduct the plate load test with a sketch and state its limitations. [10M]
 b) A 1.8 m square column is founded at a depth of 1.8 m in sand, for which the corrected N-value is 24. The water table is at a depth of 2.7 m. Determine the net allowable bearing pressure for a permissible settlement of 40 mm and a factor of safety of 3 against shear failure. [6M]

- 6 a) List various types of pile foundations. What are the conditions where a pile foundation is more suitable than a shallow foundation? [6M]
b) Explain Indian standard method of conducting a pile load test with a sketch. How do you estimate safe load carrying capacity from the results of pile load test? [10M]
- 7 a) Describe the various components of pneumatic caisson with the help of a sketch. [8M]
b) Discuss the various kinds of forces likely to act on a well foundation. [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART – A

- | | | | |
|---|----|--|------|
| 1 | a) | How do you decide the depth and lateral extent of exploration? | [4M] |
| | b) | Describe different types of slope failures. | [4M] |
| | c) | State the factors affecting location of footing. | [3M] |
| | d) | What are the components of settlement? Distinguish between them? | [3M] |
| | e) | What is negative skin friction? | [4M] |
| | f) | What do you understand by grip length? What is its importance in well foundations? | [4M] |

PART – B

- | | | | |
|---|----|--|-------|
| 2 | a) | Enumerate the various methods of subsoil exploration. Describe the procedure to conduct the Standard Penetration Test and corrections to be applied | [10M] |
| | b) | Explain pressure meter test. | [6M] |
| 3 | a) | Explain the Rankine's theory for various backfill condition to calculate active and passive state earth pressure. | [10M] |
| | b) | Discuss the Swedish arc method for the stability analysis of slopes. | [6M] |
| 4 | a) | Differentiate the terms (i) Gross pressure and net pressure (ii) Ultimate bearing capacity and net ultimate bearing capacity and (iii) Safe bearing pressure and allowable bearing pressure. | [6M] |
| | b) | A square footing carries a load of 800kN. The depth of the footing is 1.5m. The properties of the soil are $c=0$, $\phi=38^\circ$, and $\gamma=18.5\text{kN/m}^3$. Determine the size of the footing for a factor of safety of 3 against shear failure. What will be the changes in the size of the footing, if the water table rises to ground level? (for $\phi=38^\circ$, the $N_c=52$, $N_q=49$ and $N_\gamma=64$). | [10M] |
| 5 | a) | The corrected blow count from SPT in a medium sand, observed at an average depth of 2.5 m was 22 blows/30 cm. Laboratory tests conducted on the sample revealed the following physical properties: $c'=0$, $\phi'=30^\circ$ and $\gamma_t=18.5\text{ kN/m}^3$. The water table was located at 4.5 m from the ground level. It is planned to place a 2 m wide square footing at depth of 2 m. Estimate the allowable gross bearing pressure for the soil if the factor of safety against shear failure is 2.5 and limiting settlement is 25 mm. | [10M] |
| | b) | What is the significance of permissible settlement? State the permissible settlements for isolated and raft foundations in clays and Sandy Soils. | [6M] |

- 6 a) A pile is driven with a single acting steam hammer of weight 15 kN with a free fall of 900mm. The final set, the average of the last three blows, is 27.5mm. Find the safe load using the Engineering News formula. [4M]
- b) What are different types of piles and their functions? Explain with sketches. [12M]
- 7 a) Briefly explain the procedure adopted in well sinking and bring out the problems that are encountered in open sinking? [8M]
- b) Under what circumstances is a Pneumatic Caisson preferred? What are the safety Precautions to be followed in working with a Pneumatic Caisson? [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART – A

- 1 a) List out the various methods of subsoil exploration. [3M]
- b) Compare Rankine's theory and Coulomb's theory. [4M]
- c) State the circumstances to go for combined footing. [3M]
- d) What are allowable settlements of structures? [4M]
- e) What are the limitations of the dynamic pile formulae? [4M]
- f) Sketch and describe the various components of a well foundation. [4M]

PART – B

- 2 a) Enumerate the types of soil samples and distinguish them. [4M]
- b) Write briefly about the dynamic cone penetration test. [8M]
- c) State the objectives of soil exploration. [4M]
- 3 a) Explain the Coulomb wedge theory with neat sketches. [6M]
- b) Explain the active and passive states of earth pressure acting on a retaining wall. [6M]
- c) What is a stability number? What is its utility in the analysis of stability of slopes? [4M]
- 4 a) Differentiate between general shear failure, punching shear failure, punching shear failure and local shear failure. [6M]
- b) A strip footing, 1 m wide, rests on the surface of a dry cohesion less soil having $\phi = 25^\circ$ and $\gamma = 18 \text{ kN/m}^3$. What is the ultimate bearing capacity? What is the value, if there is complete flooding? Assume $N_\gamma = 10$. [6M]
- c) Explain Terzaghi's analysis of bearing capacity of soil in general shear failure. [4M]
- 5 a) How would you determine the bearing capacity from plate load tests? What are the limitations of the plate load test? [10M]
- b) A rectangular footing (3m×2m) exerts a pressure of 100 kN/m^2 on a cohesive soil ($E_s = 5 \times 10^4 \text{ kN/m}^2$ and $\mu = 0.5$). Determine the immediate settlement at the centre, assuming
 - i) the footing is flexible and
 - ii) the footing is rigid
 Take I_f for the flexible footing is 1.36 and I_f for rigid footing is 1.06 [6M]
- 6 a) In a 16 pile group, the pile diameter is 50 cm and centre to centre spacing of square group is 1.8 m. If $c = 40 \text{ kN/m}^2$, determine whether the failure would occur with a pile acting individually or as a group? Neglect the end bearing resistance of the piles. All piles are 11 m long. Take mobilization factor, α for given cohesion is 0.7 [12M]
- b) How would you estimate the load carrying capacity of a pile in cohesion less soils? [4M]

- 7 a) An open caisson, 20 m deep, is of cylindrical shape, with external and internal diameters of 9 m and 6 m, respectively. If the water level is 2 m below the top of the caisson, determine the minimum thickness of the seal required. Assume $\sigma_c = 2400 \text{ kN/m}^2$ and $\gamma_c = 24 \text{ kN/m}^3$, for concrete. Allowable perimeter shear stress = 650 kN/m^2 . [10M]
- b) What are the advantage and disadvantages of pneumatic caissons over open caissons? [6M]

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
GEOTECHNICAL ENGINEERING – II
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART –A

- 1 a) What are the different types of samples that can be obtained from soil investigation? Explain briefly. [4M]
 b) Discuss the factors influencing the slope stability. [4M]
 c) What are the assumptions made in the derivation of Terzaghi's bearing capacity theory? [3M]
 d) What are the remedial measures against harmful settlements? [4M]
 e) What are the factors consider while selecting the type of pile? [3M]
 f) What are the circumstances under which a well foundation is more suited than other types? [4M]

PART –B

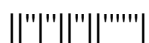
- 2 a) State the points to be considered in preparation of soil investigation report. [6M]
 b) Describe the procedure to conduct Static Cone Penetration Test. [6M]
 c) What are design features that affect the sample disturbance? [4M]
- 3 a) What are the different factors of safety used in the stability of slopes? Also describe different types of slope failures. [6M]
 b) A retaining wall is 7 m high, with its back face smooth and vertical. It retains sand with its surface horizontal. Using Rankine's theory, determine active earth pressure at the base when the backfill is (a) dry, (b) saturated and (c) submerged, with water table at 2 m below the surface. Take $\gamma_t=18 \text{ kN/m}^3$, $\gamma_{\text{sat}}=21 \text{ kN/m}^3$ and $\phi =30^\circ$. [10M]
- 4 a) List the types of foundations and explain how to select the suitable foundation for the given type of structure. [6M]
 b) What is a 'raft foundation'? When is it preferred? [4M]
 c) (b) Give the approximate Terzaghi's formula you will use for the design of:
 (i) square footing; (ii) circular footing; and (iii) rectangular footing. [6M]

- 5 a) The following are the results of a load-settlement test carried out on a 30 cm×30 cm plate inside a square pit at a depth of 1.2 m in sandy soil. Find the size of the square footing to carry a load of 700 kN at the specified settlement of 25 mm [10M]

Load, kN	0.4	1.0	1.5	2.0	2.5	3.0
Settlement, mm	1.5	3.8	5.1	7.4	11.3	14.2

- b) What are the types of foundation settlements? How is these determining? [6M]

- 6 a) What is negative skin friction in piles? Explain the causes of negative skin friction. [6M]
- b) A pile group consisting of 9 piles is arranged in 3 rows with 3 piles in each row. Diameter of each pile is 35 cm and spacing is 1.2 m. Length of pile is 10 m. The piles are driven completely in clayey soil having unconfined compressive strength of 100kN/m^2 . The piles are designed as frictional. Determine the capacity of pile group. Take $\alpha = 0.7$ [10M]
- 7 a) What are the advantages and disadvantages of a Pneumatic Caisson when compared with other types? [8M]
- b) What are the problems that encountered in well sinking? What are the remedial measures to control? [8M]



III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

TRANSPORTATION ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

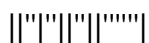
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Define wheel gauge. What are the various gauges used in India? [3M]
- b) Determine the weighted average of speed when 10 trains moves with 80kmph, 5 trains with 85kmph, 15 trains with 90 kmph and 20 trains with 75kmph. [4M]
- c) Differentiate between Cole's method Issosless triangle methods? [4M]
- d) What are the various phases recommended by FAA for airport master plan? [4M]
- e) Mention about special characteristics and requirements of airport drainage. [4M]
- f) What is the location based classification of harbors? [3M]

PART -B

- 2 a) What is permanent way? Explain functions of various components briefly? [4M]
- b) Explain the concept creep using percussion theory? How do you rectify creep? [8M]
- c) Distinguish between suspended and bridge joints in rails. [4M]
- 3 a) What do you understand negative superelevation? [3M]
- b) Compute the maximum permissible speed for the following data on a curve of high speed B.G for the following data. Degree of curve = 1.2, Amount of super elevation = 8cm, Length of transition curve = 150 m, Maximum sanctioned speed likely to be 135kmph. [8M]
- c) Explain string line method of realignment of curves. [5M]
- 4 a) Explain the necessity of points and crossings. [6M]
- b) What is the principle stop signal? Explain its components with the help of a neat signal. [10M]
- 5 a) Explain Take off climb surface. [4M]
- b) The basic runway length of an airport at an altitude of 500m above MSL is 2800m. The airport reference temperature is 43⁰ C and the effective gradient is 1.5%. Compute the corrected runway length as per FAA standards. [6M]
- c) What are the basic assumptions made in finalizing runway length? [6M]
- 6 a) Discuss how the analytical methods differ empirical methods and semi empirical methods for the design of airfield pavements [8M]
- b) Discuss in brief about maintenance management system in reference to airfield pavements. [8M]
- 7 a) Explain the formation of tides. Explain tidal day, spring tides and neap tides. [8M]
- b) What are the factors to be considered for the selection of harbors on a sandy coast and Lower reach of a river? [8M]



III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

TRANSPORTATION ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

 Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is the minimum number of sleepers required for a 2km length of rail for a broad gauge? [3M]
- b) Differentiate between ruling gradient and momentum gradient. [4M]
- c) What are the permissible speeds adopted for on different crossings? [4M]
- d) Explain various moments of aircrafts? [4M]
- e) List out special characteristics and requirements of airport drainage. [4M]
- f) Differentiate between break waters, dock and quay? [3M]

PART -B

- 2 a) What are the advantages and disadvantages of wooden sleepers? [4M]
- b) What are the requirements of ideal gauge? [8M]
- c) What would be the length of track i) to overcome temperature stress ii) to prevent creep for equilibrium? When it is given $A= 60 \text{ cm}^2$, $\alpha=1.12 \times 10^{-5} \text{ per } ^\circ \text{C}$, $E= 21.5 \times 10^5 \text{ kg/cm}^2$ and rise in temperature, i.e. $r= 32^\circ \text{C}$ and assume a 750 kg/km as resistance to track movement. [4M]
- 3 a) What are the limitations of cant deficiency? [3M]
- b) Compute the maximum permissible speed for the following data on a curve of high speed B.G for the following data. Degree of curve = 1.2, Amount of super elevation = 8cm, Length of transition curve = 150 m, Maximum sanctioned speed likely to be 135kmph. [8M]
- c) Discuss briefly about various types of transition curves used in railways. [5M]
- 4 a) Differentiate between Time interval system and Pilot guard systems of train movements. [6M]
- b) Explain various functions of interlocking. [10M]
- 5 a) Explain the importance of Turning Zoning laws. [4M]
- b) The basic runway length of an airport at an altitude of 500m above MSL is 1800m. The airport reference temperature is 45°C and the effective gradient is 1.5%. Compute the corrected runway length as per FAA standards. [6M]
- c) What are the basic assumptions made in finalizing runway length? [6M]
- 6 a) Explain the causes of airfield flexible pavement failures. [8M]
- b) Discuss in brief about maintenance management system in reference to airfield pavements. [8M]
- 7 a) Explain briefly about various types of dredgers. [8M]
- b) What are the factors to be considered for the selection of harbours on a sandy coast and Lower reach of a river? [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

TRANSPORTATION ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

 Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is the minimum number of sleepers required for a 2km length of rail for a broad gauge? [3M]
- b) Determine the weighted average of speed when 10 trains moves with 80kmph, 5 trains with 85kmph, 15 trains with 90 kmph and 20 trains with 75kmph. [4M]
- c) What is the expression used to find the distance between A.N.C. and T.N.C? [4M]
- d) What is wind coverage? Explain briefly. [4M]
- e) What are the basic types of failures occurs in rigid pavement? [4M]
- f) What are the requirements of navigational aids? [3M]

PART -B

- 2 a) Explain various types of chairs and their uses. [4M]
- b) What is the role of ballast in railway track? What are the requirements of ballast? [8M]
- c) Explain adzing of sleepers. [4M]
- 3 a) What is the necessity of widening of gauges on curves? [3M]
- b) Compute the maximum permissible speed for the following data on a curve of high speed B.G for the following data. Degree of curve = 1.2 ,Amount of super elevation = 8cm,Length of transition curve = 175 m, Maximum sanctioned speed likely to be 145kmph. [8M]
- c) Derive an expression for cant in rail curves. [5M]
- 4 a) What are scissor crossings? Explain briefly. [4M]
- b) Explain briefly about various Mechanical devices required for interlocking system. [12M]
- 5 a) Explain any one method windrose diagram for finalizing runway orientation [6M]
- b) b) The basic runway length of an airport at an altitude of 500m above MSL is 1800m. The airport reference temperature is 45⁰ C and the effective gradient is 1.5%. Compute the corrected runway length as per FAA standards. [10M]
- 6 a) Explain the causes of airfield flexible pavement failures. [8M]
- b) Discuss in brief about maintenance management system in reference to airfield pavements. [8M]
- 7 a) Explain briefly about various types of dredgers. [8M]
- b) Explain various types of break waters. [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017
TRANSPORTATION ENGINEERING – II
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- | | | |
|---|---|------|
| 1 | a) What are the factors to be considered for sleeper density? [3M] | [3M] |
| | b) What is the difference between pusher gradient and momentum gradient? [4M] | [4M] |
| | c) What is the difference between T.N.C and A.N.C? [4M] | [4M] |
| | d) What are the recommendations given by FAA normal wind components? [4M] | [4M] |
| | e) What are various methods adopted for the design of flexible airfield pavements? [4M] | [4M] |
| | f) What are the various types navigational aids used in fixed navigation structures? [3M] | [3M] |

PART -B

- | | | |
|---|---|-------|
| 2 | a) What are the requirements of a welding joint? [4M] | [4M] |
| | b) What are the different causes of creep? How do you identify creep in the field. [8M] | [8M] |
| | c) What would be the length of track i) to overcome temperature stress ii) to prevent creep for equilibrium? When it is given $A = 60 \text{ cm}^2$, $\alpha = 1.12 \times 10^{-5} \text{ per } ^\circ \text{C}$, $E = 20.5 \times 10^5 \text{ kg/cm}^2$ and rise in temperature, i.e. $r = 35^\circ \text{C}$ and assume a 720 kg/km as resistance to track movement. [4M] | [4M] |
| 3 | a) What is maximum degree of curvatures adopted on curves through tracks? [3M] | [3M] |
| | b) Compute the maximum permissible speed for the following data on a curve of high speed B.G for the following data. Degree of curve = 1.2, Amount of super elevation = 8cm, Length of transition curve = 150 m, Maximum sanctioned speed likely to be 135kmph. [8M] | [8M] |
| | c) Explain the difference between cant deficiency and negative super elevation. [5M] | [5M] |
| 4 | a) What are scissor crossings? Explain briefly. [6M] | [6M] |
| | b) Explain various functions of interlocking. [10M] | [10M] |
| 5 | a) List out Aircraft characteristics to be considered in planning an airport planning and design. [6M] | [6M] |
| | b) What is the effect of engine failure on runway length? [10M] | [10M] |
| 6 | a) Discuss in brief about maintenance management system in reference to airfield pavements. [8M] | [8M] |
| | b) Explain the causes of failures in rigid pavements. [8M] | [8M] |
| 7 | a) What are the factors to be considered for the selection of harbors on a sandy coast and Lower reach of a river? [8M] | [8M] |
| | b) Explain various types of break waters. [8M] | [8M] |

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

WATER RESOURCES ENGINEERING-I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

 Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

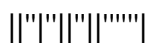
PART -A

- 1 a) Differentiate between : runoff, yield of a drainage basin and surface runoff. [3M]
- b) Define (i) Φ -index;(ii)W-index; Give the relation between them. [4M]
- c) What is unit hydrograph? Explain clearly the basic postulates of unit hydrograph theory. [4M]
- d) What is flood routing? Write down basic flood routing equation. [3M]
- e) State Dupuit's assumptions for obtaining general equations governing ground water flow. [4M]
- f) State the advantages of hydraulic model studies. [4M]

PART -B

- 2 a) What is "Hydrologic cycle" and what is its importance? [4M]
- b) How will you determine the areal rainfall over a basin by (i) Arithmetic mean method, (ii) Thiessen polygon method, (iii) Isohyetal method. [8M]
- c) Describe with a neat sketch the construction and use of a float-type of a recording gauge. [4M]
- 3 a) Write short notes on: (i)Transpiration and transpiration ratio (ii) Water shed leakage [3M]
- b) Explain with sketches the following methods for calculating net storm rain: [8M]
- i) Infiltration capacity method. ii) Φ -index method iii)W-index method
- c) Briefly describe any method by which you can measure the evaporation loss from a free-water surface. [5M]
- 4 a) Explain the procedure for derivation of Snyder's synthetic unit hydrograph for an ungaged catchment [8M]
- b) Enumerate and briefly discuss the various factors which affect the runoff from a catchment. [8M]
- 5 a) Describe step by step procedure that you will adopt for flood routing computations required for reservoirs under trial and error method. [8M]
- b) Discuss the various problems encountered during the operation of flood control reservoirs. [8M]

- 6 a) Describe the recuperation test for an open well. [8M]
- b) A well in a confined aquifer was pumped at a rate of 900 litres per minute for 8 hours. The aquifer was 6m thick. Time-drawdown data for an observation well 250m away was plotted on a semi logarithmic paper and it was found that the drawdown per log cycle was 1.68m and the time for zero drawdown was 5.2 minutes. Find T,k and S. Also determine the time during which Jacob method cannot be used at the observation well. [8M]
- 7 a) Explain the steps involved in rainfall-runoff modeling. [8M]
- b) Explain any one method of the hydrological model. [8M]



III B. Tech II Semester Regular/Supplementary Examinations, April - 2017
WATER RESOURCES ENGINEERING-I
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

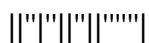
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
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 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) How will you measure the discharge of: [3M]
 i) a river? ii) a small stream? iii) a canal?
 b) Write short notes on orographic and turbulent ascent in precipitations. [4M]
 c) Define unit hydrograph and state its uses. [3M]
 d) Write a note on flood plain management. [4M]
 e) Differentiate between (i) Permeability and transmissibility (ii) Aquifers and aquicludes. [4M]
 f) What are the different types of similarities considered in hydraulic model studies. [4M]

PART -B

- 2 a) Distinguish between short range and long range weather forecasts. [4M]
 b) What is an intensity duration curve, and how will you proceed to derive such a curve for a given frequency at a rain gauge station from the available data of worst storms of different duration kept for a sufficient number of years. [8M]
 c) Discuss briefly the use of radars and satellites in weather detection and forecasting. [4M]
- 3 a) Discuss how will you used for determining the discharge (i) in a shallow river and (ii) in a wider river. What formulas are used for computing discharge measurements? [3M]
 b) What is evaporation? Mention the factors controlling the evaporation process. What do you understand by water budget determination of reservoir evaporation? [8M]
 c) What is meant by 'stream gauging'? Describe the velocity area method that is used for stream gauging. [5M]
- 4 a) What is unit hydrograph? Discuss its uses and explain how a 6-hour unit hydrograph can be determined from a given 3-hour unit hydrograph. [8M]
 b) State and explain the Rational Method which is used for computing the peak rate of runoff for the design of urban storm water drains. What are the limitations of this method? [8M]
- 5 a) Write broad outline of the National Policy on floods and flood management. [8M]
 b) What is meant by flood routing through reservoirs? Explain the steps involved in any one of the analysis. [8M]



- 6 a) What is Dupuit's equation? State the assumptions that enter in its development. Explain the Theis formula. What is well function? [8M]
- b) A 30cm dia well penetrates 20m below the static water table. After 24 hours of pumping at 5000lites per minute the water level in a test well at 100m away is lowered by 0.5m, and in a well at 30m away the draw down is 1m. What is transmissibility of the aquifer? [8M]
- 7 a) What do you understand by Instantaneous unit hydrograph? How will you construct it? [8M]
- b) Explain any one method of the hydrological model. [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017
WATER RESOURCES ENGINEERING-I
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) How would you determine statistically, the optimum number of rain gauges required to be installed in a given catchment. [3M]
 b) Explain any two methods of reducing the evaporation loss from a free-water surface. [4M]
 c) Explain how the following parameters affect run-off:- [4M]
 (i) Shape of basin, (ii) Slope of basin, (iii) Meteorological condition, (iv) Vegetative condition.
 d) How are the benefits of flood control estimated? [4M]
 e) Define: Perched aquifers, Storage coefficient, Specific capacity of wells and Well loss. [4M]
 f) What is meant by Instantaneous unit hydrograph? [3M]

PART -B

- 2 a) Explain briefly the rainfall-runoff process, indicating all the possible losses involved. [4M]
 b) What is meant by rain gauge density? What are the standards prescribed for it for different regions? [8M]
 c) What is a hydrograph and what is its use in hydrology? [4M]
 3 a) What is a stage discharge curve? How is it affected by a changing stage of the river compared to a constant stage? [3M]
 b) Write down the most common empirical formula used to calculate evaporation? What are the factors influencing evaporation? [8M]
 c) Explain: (a) evaporation, (b) infiltration, (c) interception, (d) transpiration, (e) percolation, and (f) consumptive use. [5M]
 4 a) List of various methods of determining runoff from the catchment. Give the various empirical formulae for determining the runoff indicating the area for which each of these formulae is applicable. [8M]
 b) In a certain basin ordinates of a unit hydrograph (1cm-6hr) are given [8M]
 below:

Time(in hr)	0	6	12	18	24	30	36	42	48
Ordinates(cumecs)	0	4	12	25	18	12	7	4	0

Determine the peak flood and the total volume of flood flow in the basin corresponding to storm described below:

Period (hr)	0-6	6-12
Runoff (mm)	10	20

Base flow at the time of storm was 5 cumecs.

- 5 a) How are the methods of flood control classified? Explain briefly. [8M]
b) What is flood routing? Write down basic flood routing equation. Explain in detail any one method of flood routing. [8M]
- 6 a) State Dupuit's assumptions for obtaining general equations governing ground water flow. Derive an expression for the confined aquifer. How can the expression be used to evaluate the aquifer permeability? [8M]
b) A 10cm diameter well was pumped at a uniform rate of 500 litres/min., while observations of drawdown were made in an observation well located at a distance of 50m from the well. The original head of water, measured from the top of the impervious layer was 25m. The hydraulic conductivity of the aquifer was 1.83×10^{-3} m/min. determine the drawdown at the face of the well and assuming that the flow to the unconfined aquifer is unsteady state. [8M]
- 7 a) What are the steps involved in rainfall-runoff modeling? [8M]
b) Explain any one method of the hydrological model. [8M]

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017
WATER RESOURCES ENGINEERING-I
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is a hydrograph and what is its use in hydrology? [3M]
 b) Explain: i) evaporation, ii) infiltration, iii) transpiration, and iv) consumptive use. [4M]
 c) Explain briefly what is a unit hydrograph and a distribution graph is? [4M]
 d) Explain the terms: (i) Design flood (ii) Maximum probable flood and (iii) Standard project flood. [3M]
 e) Explain: i) Specific retention of a soil ii) Specific yield of an aquifer [4M]
 iii) Storage coefficient of an aquifer iv) Specific capacity of a well.
 f) What do you understand by rainfall-runoff modeling? [4M]

PART -B

- 2 a) Differentiate between Recording and Non-recording types of rain gauges. [4M]
 b) The isohyets for annual rainfall over a catchment were drawn and the areas of the strips between isohyets are obtained as below. Determine the average depth of annual precipitation over the area. [8M]

Isohyets (mm)	450-550	550-650	650-750	750-950	950-1150	1150-1250
Area (km ²)	1200	3000	2800	1000	900	600

- c) Distinguish between 'cold clouds' and 'warm clouds', explaining simultaneously the process of formation of rain drops in each of them. [4M]
- 3 a) What do you understand by infiltration index? How do you determine it? [3M]
 b) Briefly describe any method by which you can measure the evaporation loss from a free-water surface. [8M]
 Explain any two methods of reducing the evaporation loss from a free-water surface.
 c) Enumerate the different methods which are used for stream gauging. Discuss any one of these methods in details. [5M]
- 4 a) Explain the procedure for derivation of Snyder's synthetic unit hydrograph for an ungaged catchment. [8M]

- b) An isolated intense storm of 30minutes duration occurred over a catchment basin of 283.28 hectares. The estimated average depth of precipitation was 6.35 cm over the entire area and half hourly stream flows resulting from the above storm were noted as follows: [8M]

Time	Q in cumecs	Time	Q in cumecs
7.00am	3.40	1.00pm	7.93
7.30am	3.35	1.30pm	7.20
8.00am	3.30	2.00pm	5.60
8.30am	4.00	2.30pm	5.30
9.00am	6.40	3.00pm	4.60
9.30am	6.90	3.30pm	-
10.00am	13.75	4.00pm	4.40
10.30am	13.45	4.30pm	3.85
11.00am	13.30	5.00pm	3.75
11.30am	11.05	5.30pm	3.70
12.00noon	9.65	6.00pm	-
12.30pm	6.78	6.30pm	3.70

Draw unit hydrograph for the above basin.

- 5 a) Discuss briefly the economics of flood control. How are the benefits of flood control estimated? [8M]
- b) What if flood routing? Write down basic flood routing equation. Explain in detail any one method of flood routing. [8M]
- 6 a) Write short notes on the following: [8M]
- i) Darcy's law for measuring velocity of ground water flows
- ii) Permeability and transmissibility and their relationship
- b) A well penetrating an aquifer which is underlain and overlain by impermeable layers was tested with uniform discharge of 1000 litres/min. The steady state drawdowns measured in two observations wells which were at 1m and 10m radial distances from the centre of the pumped well were 13.40m and 4.2m respectively. Determine the hydraulic properties of the aquifer if its saturated thickness is 10m. [8M]
- 7 a) What are the steps involved in hydrological model studies. Explain briefly any one method. [8M]
- b) What do you understand by Instantaneous unit hydrograph? How will you construct it? [8M]
