Ex/ CON/PC/B/T/315/2024(S)

B.E. CONSTRUCTION ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAMINATION-2024

Subject: WATER RESOURCES & IRRIGATION ENGG

Time : Three hours Full Marks : 100

Different parts of the same question should be answered together.

(50 Marks for each Part)

Use separate answer script for each Part

(50 Marks)

Ex/ CON/PC/B/T/315/2024(S)

B.E. CONSTRUCTION ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAMINATION-2024

Subject: WATER RESOURCES & IRRIGATION ENGG

Time: Two hours **Full Marks: 50**

Different parts of the same question should be answered together.

PART-I

Answer all questions

1. What is filtration? How does a sand filter act in the purification of water? What do you mean by water quality standard for drinking water?

OR

Design a rapid sand filter to treat 20.**xx** million litres of raw water per day allowing 0.6**xx**% of filtered water for backwashing. Half hour per day is used for backwashing. Assume necessary data. (15)

2. Draw the flow diagram of a water treatment plant for a medium sized municipal town having a river as the source of water supply?

OR

Briefly describe the different methods of distribution of water, with their relative advantages and disadvantages. (5)

3. The population of a town in four consecutive decades (1971 to 2001) received from the census report were found to be 80,000; 1, 20,000; 1, 68,000; and 2, 28,580. Predict the population in the above town in the year 2031 using decreasing rate of increase / Incremental increase method.

OR

Design a rectangular sedimentation tank to treat 2.5**xx** million litres of raw water per day. The detention period may be assumed to be 3 hours. (15)

4. Design the most efficient cross-section of a lined trapezoidal canal to carry a discharge of 16.**xx** cumecs when the maximum permissible velocity is 3.**xx** m/s. Assume the side slopes as 1: 1. Also, determine the bed slope for the canal if the Chezy's coefficient C is 60.**xx**

Ref. No.: Ex/CON/PC/B/T/315/2024(S)

B.E. CONSTRUCTION ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2024

SUBJECT: WATER RESOURCES & IRRIGATION ENGG

Time : Three hours (50 Marks for each Part) Full Marks : 100

Use separate answer script for each Part

PART II (50 marks)

No. of Questions		Marks
	Answer Q. No. 1 and any two from the rest.	
Q.1 i)	Write **TRUE** or **FALSE**: a) Ordinates of the unit hydrograph are multiplied by the volume of the runoff hydrograph to obtain the ordinates of the direct runoff hydrograph. b) Fan shaped catchments give lower runoff than Fern shaped catchments. c) Form factor is directly proportional to the square of the axial length. d) Ranking of the storm is given by the recurrence interval divided by the total number of years on record. e) In case of moderate rain of uniform intensity, the W_{index} will be equal to Φ_{index} .	1 x 5
Q.1ii)	Write short notes on the following: a) Price's current meter b) Recurrence interval of time c) W_{index} and Φ_{index} d) Duty and delta e) Determination of peak flood discharge by means of empirical formulae.	1 x 5

Ref. No.: Ex/CON/PC/B/T/315/2024(S)

B.E. CONSTRUCTION ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2024

SUBJECT: WATER RESOURCES & IRRIGATION ENGG

Time : Three hours (50 Marks for each Part) Full Marks : 100

Use separate answer script for each Part

PART II (50 marks)

<table>
<tr><th>No. of Questions</th><th></th><th>Marks</th></tr>
<tr><td>Q.2a.</td><td>Write down equation for Infiltration Capacity curve given by Horton explaining meaning of the various terms.</td><td>5</td></tr>
<tr><td>Q.2b.</td><td>The infiltration capacities of an area at different intervals of time are indicated below. Find an equation for the infiltration capacity in the exponential form.
<table>
<tr><td>Time in hours</td><td>0</td><td>0.25</td><td>0.5</td><td>0.75</td><td>1.00</td><td>1.25</td><td>1.5</td><td>1.75</td><td>2.00</td></tr>
<tr><td>Infiltration capacity (f) in cm/hr</td><td>10.4</td><td>5.6</td><td>3.2</td><td>2.1</td><td>1.5</td><td>1.2</td><td>1.1</td><td>1.0</td><td>1.0</td></tr>
</table></td><td>15</td></tr>
<tr><td>Q.3a.</td><td>State and explain the various methods for estimating the mean rainfall over a drainage basin. Discuss the merits and demerits of these methods.</td><td>7</td></tr>
<tr><td>Q.3b.i)
ii)</td><td>Explain the Thiessen's method with a neat sketch.
The isohyets for annual rainfall over a catchment basin were drawn. The areas of strips between the isohyets are indicated below. Find the average depth of annual precipitation over the basin.
<table>
<tr><th>Isohyets in cm</th><th>Area in sq. km.</th><th>Isohyets in cm.</th><th>Area in sq. km.</th></tr>
<tr><td>75 – 85</td><td>580</td><td>105 – 115</td><td>1000</td></tr>
<tr><td>85 – 95</td><td>2960</td><td>115 – 135</td><td>610</td></tr>
<tr><td>95 - 105</td><td>2850</td><td>135 - 155</td><td>160</td></tr>
</table></td><td>5 + 8</td></tr>
<tr><td>Q.4a)</td><td>State the importance of ground water in the construction of hydrograph.</td><td>5</td></tr>
</table>

Ref. No.: Ex/CON/PC/B/T/315/2024(S)

B.E. CONSTRUCTION ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2024

SUBJECT: WATER RESOURCES & IRRIGATION ENGG

Time : Three hours (50 Marks for each Part) Full Marks : 100

Use separate answer script for each Part

PART II (50 marks)

<table>
<tr><th>No. of Questions</th><th></th><th>Marks</th></tr>
<tr><td>Q.4b)</td><td>The ordinates of a 3 hour unit hydrograph are given below.
<table>
<tr><td>Time in hr</td><td>0</td><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td><td>21</td><td>24</td><td>27</td><td>30</td></tr>
<tr><td>Ordinates in m^3/sec</td><td>0</td><td>10</td><td>25</td><td>20</td><td>16</td><td>12</td><td>9</td><td>7</td><td>5</td><td>3</td><td>0</td></tr>
</table>
Find the ordinates of a 6 hr unit hydrograph for the same basin, analytically. Also sketch this unit hydrograph. What is the peak value of discharge in this unit hydrograph?</td><td>15</td></tr>
</table>