Name:

Enrolment No:

UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Water Resources Engineering — **Semester: VI**
Program: B Tech Civil Engineering — **Time: 3 Hours**
Course Code: CIVL 3008 — **Max. Marks: 100**

Instructions:
a) Attempt all the questions
b) Strictly follow the time limit prescribed

SECTION A

S. No.		Marks	CO
Q1	What is so unique about the Indian precipitation system?	**4**	**CO1**
Q2	With respect to the recent Amphan Cyclone, explain the phenomenon behind the cyclonic rainfall.	**4**	**CO1**
Q3	What do you understand by spurious correlation/ false correlation? Give an example	**4**	**CO2**
Q4	With respect to PM-KSY (per drop more crop), explain the potential of micro-irrigation in India.	**4**	**CO3**
Q5	Which is the most dominant irrigation practice used in your area?	**4**	**CO3**

SECTION B

Q6	When long records are not available, records at two or more stations are combined to get one long record for the purposes of recurrence interval calculation. This method is known as Station-year method. The number of times a storm of intensity 6 cm/h was equaled or exceeded in three different rain gauge stations in a region were 4, 2 and 5 for periods of records of 36, 25 and 48 years. Find the recurrence interval of the 6 cm/h storm in that area by the station year method. Also state the importance of return period.	**10**	**CO1**
Q7	The mass curve of rainfall of duration 100 min is given below. If the catchment had an initial loss of 0.6 cm and φ-index of 0.6 cm/h, calculate the total surface runoff from the catchment. Time from start of rainfall (min): 0, 20, 40, 60, 80, 100 Cummulative rainfall (cm): 0, 0.5, 1.2, 2.6, 3.3, 3.5 On the basis of above example, construct a mass curve by taking the most recent available record of rainfall data in your respective area. Using the parameters from the above questions, calculate the direct runoff.	**10**	**CO2**

<table>
<tr><td>Q8</td><td>Given below are observed flows from a storm of 6-h duration on a stream with a catchment area of 500 km^2

<table><tr><td>Time (h)</td><td>0</td><td>6</td><td>12</td><td>18</td><td>24</td><td>30</td><td>36</td><td>42</td><td>48</td><td>54</td><td>60</td><td>66</td><td>72</td></tr><tr><td>Observed flow (m^3/s)</td><td>0</td><td>100</td><td>250</td><td>200</td><td>150</td><td>100</td><td>70</td><td>50</td><td>35</td><td>25</td><td>15</td><td>5</td><td>0</td></tr></table>
Assuming the base flow to be zero, derive the ordinates of the 6-h unit hydrograph.</td><td>10</td><td>CO2</td></tr>
<tr><td>Q9</td><td>Determine the field capacity of a soil from the following data:
a) Depth of root zone = 3.6m
b) Existing moisture = 4%
c) Dry density of soil = 1450 kg/m^3
d) Quantity of water applied to soil = 750 m^3
e) Water lost in deep percolation and evaporation = 10 %
f) Area to be irrigated = 1000 m^3</td><td>10</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td>Q10</td><td>Design a regime channel for a discharge of 100 m^3/s and silt factor 1.5 using Laceys’s theory.
Design an irrigation channel for the same discharge with base to width ratio of 3 and critical velocity ratio is 1. Assume a suitable value of Kutter’s coefficient and use Kennedy’s method.
Also explain the final channel section which you will be choosing on the basis of above design. While doing so describe the factors which led you prefer one method over the other.</td><td>20</td><td>CO4</td></tr>
<tr><td>Q11</td><td>The following hydraulic data pertains to a bridge site of a river:
Max. Discharge = 1000 m^3/s
HFL = 110m
River Bed Level = 90m
Average diameter of river bed material = 0.5m
Design and sketch Bell’s Bunds including the launching apron to train the river.</td><td>20</td><td>CO5</td></tr>
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