Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, Dec 2020

Course: Design of Hydraulic Structures — **Semester: VII**
Program: B Tech Civil Engineering — **Time: 03 Hours**
Course Code: CIVL 4002 — **Max. Marks: 100**

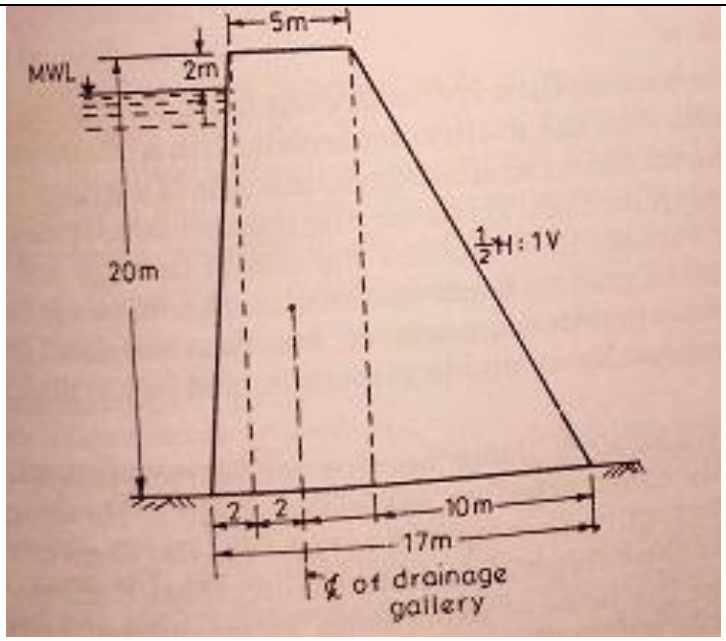
Instructions: Attempt all the questions

SECTION A (6 x 5 = 30 marks)

1. **Each Question carries 5 marks**
2. **Instruction: Complete the statement/Select the correct answer(s)**
3. **Choose the best possible answer in case of MCQ**
4. **Also explain your answer in 1-2 line(s)**

S. No.		Marks	CO
Q1	For usual values of permissible compressive stress and specific gravity of concrete, a high concrete gravity dam is· the one, whose height exceeds : (a) 48 m (b) 70 m (c) 88 m (d) none of these.	5	CO2
Q2	The most preferred type of an earthen dam section is the one, in which the: a) Entire embankment is made of one type of soil. b) Inner embankment is made of highly porous soil, surrounded by the outer shell of highly impervious soil, both separated by transition filter material of mediocre permeability. c) Inner embankment is made of highly impervious soil surrounded by the outer shell of highly pervious soil, both separated by transition filter material of mediocre permeability d) None of the above.	5	CO1
Q3	The horizontal destabilizing force caused by the formation of waves in a storage reservoir having a fetch of 40 km, due to high wind of 160 km/h, is about: (a) 30 kN (e) 90 kN (b) 60 kN (d) 130 kN	5	CO1
Q4	If 20% of the reservoir capacity is earmarked for dead storage in a storage reservoir of 30 M cum; and the average annual silt deposition in the reservoir is 0.1 M- cum, then the useful life of the reservoir will start reducing after : (a) 60 years (b) 120 years (c) 240 years (d) 300 years.	5	CO2
Q5	You have to select turbines for a hydropower plant, having 150 m head of stored water behind the dam. The water in the reservoir is clear, and load on the power house is not likely to fluctuate much. Which type of turbines will you generally recommend?	5	CO2

<table>
<tr><td></td><td>(a) Pelton turbine
(b) Francis turbine
(c) Kaplan turbines
(d) Any of them.</td><td></td><td></td></tr>
<tr><td>Q6</td><td>400 cumecs of water is being released from a dam storage to meet the downstream demand, through the turbines of the connected hydroplant. The effective head of water acting on the turbines is 50 m. The efficiency of the hydroplant is 0.8. Calculate the electrical power generated from this plant.</td><td>5</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION B (10 x 5 = 50 marks)
1. Each Question carries 10 marks
2. Instruction: Write Short/brief notes</td></tr>
<tr><td>Q7</td><td>Explain the design and specifications for the Guide banks</td><td>10</td><td>CO1</td></tr>
<tr><td>Q8</td><td>Explain (<u>with the help of a diagram</u>) the energy dissipating measure for the case when tail water curve coincides with the jump height curve,</td><td>10</td><td>CO1</td></tr>
<tr><td>Q9</td><td>The yield of water in Mm3 from a catchment area during each successive months is given in the table 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.
<table>
<tr><td>1.4</td><td>2.1</td><td>2.8</td><td>8.4</td><td>11.9</td><td>11.9</td></tr>
<tr><td>7.7</td><td>2.8</td><td>2.52</td><td>2.24</td><td>1.96</td><td>1.68</td></tr>
</table></td><td>10</td><td>CO2</td></tr>
<tr><td>Q10</td><td>Design an ogee spillway for a concrete gravity dam having the d/s face sloping at a slope of 0.7H: 1V. The design discharge is 5000 m^3/s. The height of the spillway crest is kept at RL 200.0 m. The average river bed level at the site is 100 m. The spillway length consists of 6 spans having a clear width of 10m each. <u>Calculate the coordinates only for d/s profile.</u></td><td>10</td><td>CO3</td></tr>
<tr><td>Q11</td><td>A small-scale hydraulic power system has an elevation difference between the reservoir water surface and the pond water surface downstream of the turbine is 10 m. The flow rate through the turbine is 1 m^3/s. The turbine/generator efficiency is 83%. Determine the power produced if:
a) Flow losses are neglected.
b) Assume friction loss equivalent to 1 m head.</td><td>10</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION-C (20 x 1 = 20 marks)
1. Each Question carries 20 marks
2. Instruction: Write long answer.</td></tr>
<tr><td>Q12</td><td>The given figure shows the section of a concrete gravity dam. Check the stability of this dam section at the base. Assume the missing data. Use all the modes of failure. Allowable stress in concrete may be taken as 2500kN/m^2.</td><td>20</td><td>CO3</td></tr>
</table>

	 5m MWL 2m 20m ½H : 1V 2 2 10m 17m ℄ of drainage gallery			