Military Institute of Science & Technology (MIST)
Final Quiz
Course Code: EWC 362; Course Title: Open Channel Flow Sessional
Level – 03, Term -02

Total Marks: 50 **Time: 60 mins**

1. **Fill in the gaps with appropriate words:** 5
   a. Sluice gates commonly control_____ and _____in rivers and canals.
   b. In order to get higher_____, hydraulic jumps are used in a flood gate, by pushing back the _____ and as a result, it functions under _____conditions.
   c. Specific energy will be only function of depth of flow, if _____ and _____ is constant.
   d. The concept of _____and _____ are very useful in the analysis of problems connected with transitions.
   e. The discharge is _____ at critical state for a given specific energy.

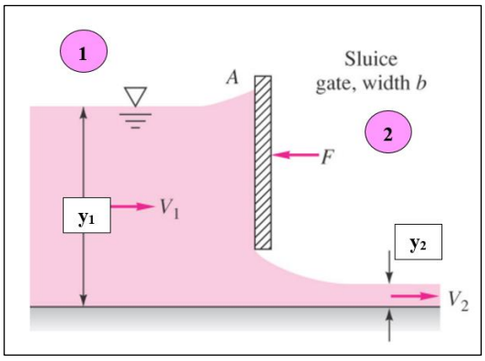
2. **Write 'T' for true and 'F' for false for the statements below.** 5
   a. The pressure distribution along the surface of the sluice gate is hydrostatic.
   b. Hydraulic Jump increases the uplift pressure under a structure by increasing weight of its apron.
   c. The sum of the hydrostatic force at any section is called specific force.
   d. Generally, with the increase in depth of flow the value of Manning's n increases and the value of Chezy's C decreases.
   e. In specific force curve, at y→ ∞, F→ ∞, but the moment F becomes proportional y.

3. When does the submergence occur and what is its effect on flow beneath a sluice gate? 3

4. Briefly explain the behavior of the efficiency curve of a hydraulic jump with increasing Froude number. 3

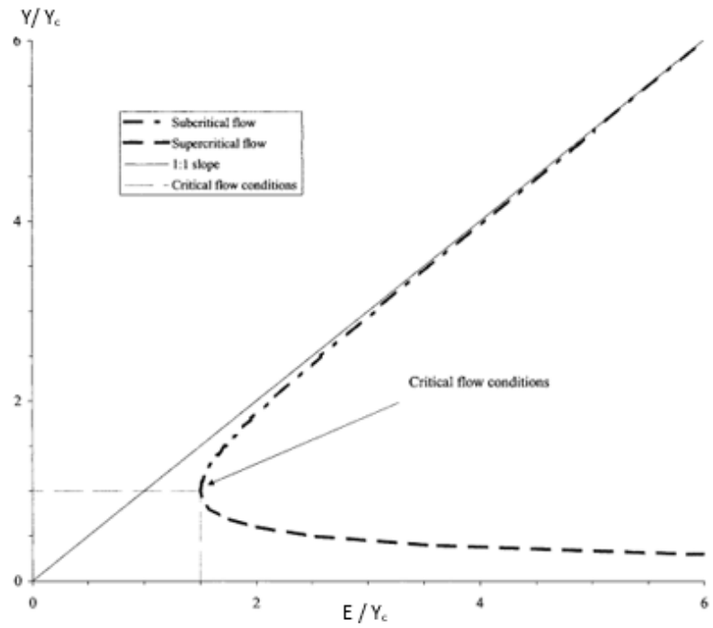
5. There is a limit to the number of strips or segments in determining the discharge of a river by the area-velocity method. What is the limit and why is this limit? 3

6. A sluice gate controls flow in open channels. At sections 1 and 2, the flow is uniform and the pressure is hydrostatic. Neglecting bottom friction and atmospheric pressure, decide the velocities V_1 and V_2, and the horizontal force F_g required to hold the gate if y_1= (5.4 + last two digits of your student ID x 0.01) m, y_2 = 1 m and b = 5 m. 8



7. A rectangular channel is provided with a energy dissipater. It is required to have an energy loss of 4.5m. The inlet Froude number is 9.6. Find the sequent depth and final velocity. 9

8. Calculate the specific force, F at the given section at which specific energy, E = (0.2+x) m from the dimensionless specific energy curve. The discharge Q = (0.06+y) m^3/s and width of the flume width, b=0.6 m. 8
   Where,
   x=0.001*last two digits of your student ID
   y=0.0001*last two digits of your student ID
   Note: Calculate for subcritical region only.



9. Water flows at a velocity of (1.8 + $\frac{last\ two\ digit\ of\ your\ student\ ID}{100}$) m/s and a depth of (1.6 + $\frac{last\ two\ digit\ of\ your\ student\ ID}{100}$) m in a long rectangular channel 3.5 m wide. Compute the height of a smooth upward step in the channel bed to produce critical flow, assuming that the discharge in the channel does not change. In this case neglect energy losses and α = 1. 6

Military Institute of Science & Technology (MIST)
Quiz-01
Course Code: EWC 362; Course Title: Open Channel Hydraulics Sessional
EWCE – 04, Level – 03, Term -02

Marks: 50 **Time: 1 hr 30 mins**

Notes:

- You can assume any reasonable value if necessary

1. State whether the statement is True or False [06]

a. Usually, Surface tension of fluid does not affect open channel flow. T

b. When a heavy burden of erosion debris is present in the stream, the Parshall flume becomes invalid like weir. T

c. Parshall flume cannot withstand a relatively high degree of submergence over a wide range of backwater condition F

d. The sharp crested weir operates effectively with higher downstream water levels than a broad crested weir. F

e. For measurement of discharge with Venturi flumes two measurements, one upstream and one at the throat (narrowest cross-section), are required. T

f. Venturi flume is used in flow measurement of very large flow rates, usually given in millions of cubic units. T

2. Fill In the blanks with appropriate answers [05]

a. The reason of downward sloping throat section is to....increase..... the head difference between upstream section and .....critical.....section.....

b. A Venturi flume is a critical flow open flume with a constricted flow which causes a drop in the hydraulic grade line.

c. Calibration means development of a definite relationship between head and discharge of a flow measuring structure.

d. In most open channel flows like flow in rivers and canals, are subcritical turbulent.

e. In order to determine the state of flow and critical depth, we use broad crested to measure discharge.

3. Where (location) do you measure the flow in a Parshall flume and why? **[03]**

4. Broad crested weir designed so that $0.07 \leq H_1 / L \leq 0.5$. What does the upper and lower limit signify? **[03]**

5. Reynolds Number and Froude Number, which one is more significant in determining the flow behavior of a river? Why? **[03]**

6. What is the difference between free flow and submerged flow? How can you create submerged flow in laboratory flume? **[03]**

7. **C**onsider a rectangular flume of 1 ft wide in which a certain amount of discharge is passing through the channel. If the Froude number of this flow is 1.5 and Reynold number of its is 54700, what will be the depth of flow? Assume, room temperature of the Laboratory is T°C. **[06]**

T = 20°C + (Roll No. /20)

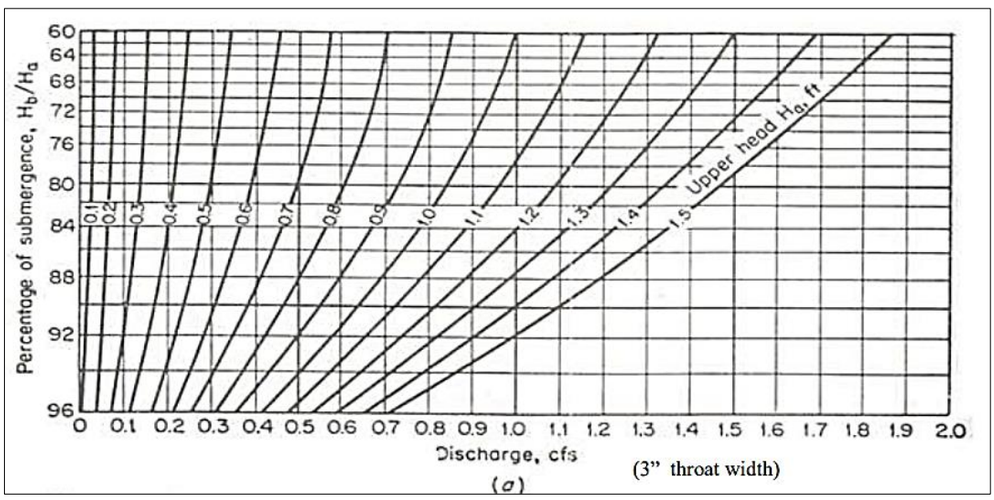
Temperature, °C	**Kinematic Viscosity ע*10^{-6}, m^2/sec**
20	1.002
25	0.890

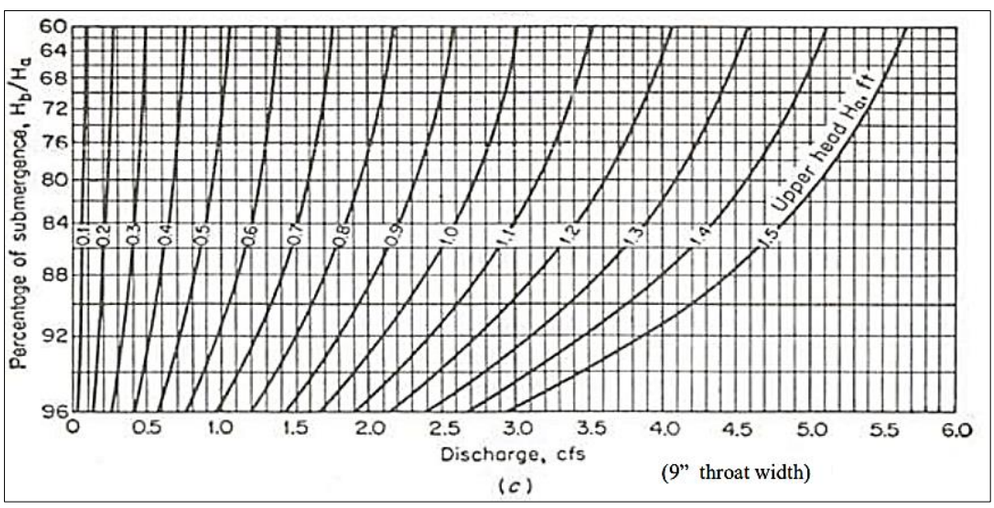
8. A Parshall flume is used to measure discharge in a channel. **The throat width is 3 inches (for ODD roll numbers) and 9 inches (for even roll numbers).** If the measured depth at the upstream is 0.1905 m, what is the discharge at free flow condition? If the % submergence is 70%**,** calculate the quantity of flow at submerged flow condition? **[10]**

[Use the following table and graphs]

Table 1 for Question No. 8

Throat width	**Equation**
3″	$Q= 0.992\ H_a^{1.547}$
6″	$Q= 2.06\ H_a^{1.58}$
9″	$Q= 3.07\ H_a^{1.53}$
12″ to 8′	$Q = 4WH_a^{1.552W^{0.026}}$
10′ to 50′	$Q= (3.6875W + 2.5)\ H_a^{1.6}$





9. a) A broad crested weir having width of (60+ last two digit of your roll) cm has 1.08 as coefficient of discharge where depth of water over the crest is 15.8 cm. Determine the actual discharge. **[4]**

b) Find out the calibration equation for a broad crested weir by completing the Table: 2 with the given values of water level over the crest and discharge. **[4]**

c) Find out the calibration equation for a broad crested weir using the given calibration graph. **[3]**

Table: 2 for Question no. 9. (b)

y_1	**Q**	X= log y_1	Y= log Q	XY	X^2	Y^2
0.158	0.069+ Last 2 digit of roll/ 1000					
0.141	0.0589 +Last 2 digit of roll/ 1000					
0.129	0.051 + Last 2 digit of roll/ 1000					
Summation		$\sum X =$	$\sum Y =$	$\sum XY =$	$\sum X^2 =$	$\sum Y^2 =$

Figure 1 for Question no.9. (c)

