University of Mumbai
Examination Second Half 2022 under cluster __ (Lead College: _____)

Program: **Civil Engineering**

Curriculum Scheme: 2019 Scheme

Examination: BE Semester V

Course Code: CEC502 and Course Name: Applied Hydraulics

==

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	If the Froude number in open channel flow is equal to more than 1.0 , the flow is called
Option A:	Critical flow
Option B:	Streaming flow
Option C:	Shooting flow
Option D:	Laminar flow
2.	The maximum velocity through a circular channel takes place when depth of flow is equal to
Option A:	0.95 times the diameter
Option B:	0.5 times the diameter
Option C:	0.81 times the diameter
Option D:	0.75 times the diameter
3.	The discharge through a trapezoidal channel is maximum when
Option A:	Half of top width = sloping side
Option B:	Top width = half of sloping side
Option C:	Top width = 1.5 X sloping side
Option D:	Top width = 2 X sloping side
4.	A turbine is called reaction turbine if at the inlet of the turbine the total energy is
Option A:	Kinematic energy only
Option B:	Kinetic energy and pressure energy
Option C:	Pressure energy only
Option D:	Kinetic energy only
5.	The depth of flow at which specific energy is minimum is called
Option A:	Normal depth
Option B:	Critical depth
Option C:	Alternate depth
Option D:	Critical flow
6.	The force exerted by a jet of water on a stationary inclined plate in the direction of jet is given by
Option A:	$Fx = \rho A V^2 \sin^2 \theta$
Option B:	$Fx = \rho A V^2 [1 + \cos \theta]$

Option C:	$F_x = \rho AV^2$
Option D:	$F_x = \rho AV$
7.	Hydraulic accumulator is a device used for
Option A:	Lifting heavy weight
Option B:	Storing the energy of a fluid in the form of pressure energy
Option C:	Increasing the pressure intensity of a fluid
Option D:	Decreasing the pressure intensity of a fluid
8.	Mechanical efficiency of a centrifugal pump is given by
Option A:	Power at the impeller / S.H.P
Option B:	S.H.P./ Power at the impeller
Option C:	Power possessed by water / power at the impeller
Option D:	Power possessed by water / S.H.P.
9.	Specific speed of a pump is the speed at which a pump runs when
Option A:	Head developed is unity and discharge is one cubic metre.
Option B:	Head developed is unity and shaft horse power is also unity
Option C:	Discharge is one cubic metre and shaft horse power is unity.
Option D:	Head developed is not unity and discharge is one cubic metre.
10.	Cavitation can take place in case of
Option A:	Pelton wheel
Option B:	Francis turbine
Option C:	Reciprocating pump
Option D:	Kaplan turbine

Q2	Solve any Two Questions out of Three 10 marks each
A	i) Explain moment of momentum equation ii) Explain the different types of efficiency in Centrifugal pump.
B	Water flows in a rectangular channel of 4m width at a depth of 2.50 m and velocity of 2.25 m/s .If the width of channel is reduced to 2.50 m and the bed of channel is raised by 0.20 m at a section, how the level of water surface in the channel will be affected.
C	A pelton wheel is to be designed for the following specification Shaft Power = 735.75 kw , Head = 200 m , speed = 800 rpm , overall efficiency = 0.86 , and jet diameter is not to be exceed one tenth the wheel diameter. Determine 1. Wheel diameter 2. The number of jets required 3. Diameter of the jet. Take Coefficent of velocity = 0.98 and speed ratio = 0.45 .

Q3	Solve any Two Questions out of Three 10 marks each

A	i) Find the force exerted by a jet of water of diameter 75 mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 20 m/s. ii) Centrifugal pump discharges 0.15 m^3 s of water against a head of 12.5 m, the speed of impeller being 600 r. p. m the outer and inner diameter of impeller are 500 mm and 250 mm respectively and the vanes are bent back at 35° to the tangent at exit. If the area of flow remains 0.07 m2 from inlet to outlet, Calculate 1. Manometric efficinecy of pump. 2. Vane angle at inlet.
B	The discharge of water through a rectangular channel of width 6 m is 18 m^3 / sec when depth of flow of water is 2 m. Calculate specific energy of flowing water, critical depth, critical velocity and minimum specific energy.
C	A kaplan turbine develos 24647.6 kw power at an avergae head of 39 metres. Assuming a seed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90 %, calculate the diameter. speed and specific seed of the turbine.

Q4	Solve any Two Questions out of Three 10 marks each
A	i) What is hydraulic intensifier? Explain its principal and working? ii) A jet of water of 2.5 cm diameter, moving with a velocity of 10 m/s, strikes a hinged square plate of weight 98.1 N at the Centre of the plate. The plate is of uniform thickness. Find the angle through which the plate will swing. ?
B	Explain Hydraulic jump? Derive expression for energy loss in hydraulic jump
C	A trapezoidal channel with a side of 1:1 has to be designed to convey 10 m ^3 / sec at a velocity of 2 m/sec, so that the amount of concrete lining for the bed and sides is minimum. Calculates the area of lining required for the bed and sides is minimum. Calculates the area of lining required for one meter length of channel. If the rugosity coefficient N = 0.015, calculate the bed slope the channel for uniform flow. .