



VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

[Central Technological Institute, Maharashtra State]

Matunga, Mumbai-400 019

SEMESTER EXAMINATION	<i>Re-Examination</i>	DATE OF EXAM	16-7-11
SEMESTER & PROGRAM	<i>IV.S.Y. B. Tech.(Civil)</i>	TIME	2.30pm to 5.30pm
TIME ALLOWED	<i>3 HRS.</i>	MARKS	100
COURSE (CourseCode) :	<i>Applied Hydraulics (CE0005)</i>		

- Instructions
- 1 All questions carry equal marks.
 2. Figures to the right indicate full marks.

- Q.1 (a) Draw only the flow diagram (show assumed value of discharge) (05)
for an equilateral triangle which is divided into two parts by a
vertical from the vertex to the mid point of the horizontal base.
The value of K for vertical bisector is 4, for base 2, and for sides
3. The inflow at vertex is 100 units and out flow at remaining two
corners is 40 units.
- (b) Define: compound pipes, Water hammer, TEL, HGL, pipes in (05)
parallel.
- (c) Which are the various dimensionless numbers? (02)
- (d) A broad crested weir of 50 m length has 75 cm height of water (02)
above its crest. Find maximum discharge. $C_d=0.62$
- (e) Which are the properties of the most economical trapezoidal (03)
section of an open channel?
- (f) Draw specific energy curve showing all the details. (03)
- Q.2 (a) Solve any TWO
- (i) Derive the conditions for the most economical triangular (05)
section.
- (ii) Find the expression for the drag force on a smooth (05)
sphere of dia D, moving with a uniform velocity V, in a
fluid of density ρ and dynamic viscosity μ . Use
Rayleigh's method of dimensional analysis.
- (iii) For a laminar flow of an oil having dynamic viscosity (05)
 $\mu=1.766$ Pa.s in a 0.3 m dia pipe. The velocity at the
centre of the pipe is 3m/s. Calculate the shearing stress
at the pipe wall.
- (b) A sluice gate discharges water into a horizontal rectangular (10)
channel with a velocity of 6m/s and depth of flow is 0.4 m. The
width of the channel is 8 m. Determine whether hydraulic jump
will occur? If so, find its height and loss of energy per kg of
water. Also determine power lost in the hydraulic jump.

CPT

- Q.3 Solve any TWO. (10)
- (a) A horizontal pipe line 40m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25m of its length from the tank, the pipe is 150mm dia and its dia is suddenly enlarged to 300mm. The height of water level in the tank is 8m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Take coefficient of friction $f=0.01$. (10)
- (b) A siphon of dia 200mm connects two reservoirs having difference in elevation of 20m. The length of the siphon is 500m and the summit is 3m above the water level in the upper reservoir. The length of the pipe from upper reservoir to the summit is 100m. Determine the discharge through the siphon and pressure at Summit. Neglect minor losses. Coefficient of friction $f=0.005$. (10)
- (c) Derive an equation for calculating one of the sloping sides and hydraulic mean depth for the most economical trapezoidal section of an open channel. (10)
- Q.4 (a) A pipe of 300mm dia conveying $0.30\text{m}^3/\text{s}$ of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of the bend are $25\text{N}/\text{cm}^2$ and $24\text{N}/\text{cm}^2$ respectively. (10)
- (b) Derive an equation for velocity in case of a laminar flow through a pipe and prove that it is parabolic in nature. (10)
- Q.5 Write an explanatory note on: (Any FOUR) (20)
- (a) Types of similarity in case of models and prototype.
- (b) Hydrodynamically smooth and rough boundaries.
- (c) Energy thickness, Momentum thickness, Displacement thickness.
- (d) Parshall flume.
- (e) Hydraulic Jump.