

**B.TECH. SEM -V (CIVIL) 2014 COURSE (CBCS) : SUMMER -
2018**

SUBJECT: ADVANCED MECHANICS OF FLUID

Day : **Friday**

Time: **10.00 AM TO 01.00 PM**

Date : **25/05/2018**

S-2018-2333

Max. Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Assume suitable data if necessary.

Q.1 a) What is specific force in case of open channel flow? **[05]**

b) Find velocity of flow and rate of flow of water through rectangular channel 6m wide and 2.5m deep running full. The channel is having bed slope 1 in 2000. Take $C=50$. **[05]**

OR

a) Explain devices used for measurement of velocity in open channel flow. **[05]**

b) Find bed slope of trapezoidal channel section with bed width 5m depth of water is 2.5m and side slopes are 3H: 4V. The discharge through channel is $30 \text{ m}^3/\text{s}$. Take $C=65$. **[05]**

Q.2 a) Differentiate between GVF and RVF. **[05]**

b) Draw neat sketch showing profiles on horizontal slope. **[05]**

OR

a) How bed slopes are classified using relative values of y_n and y_c ? **[05]**

b) What are the steps in Direct Step Method for calculation of GVF? **[05]**

Q.3 a) Prove that for hydraulic jump energy loss is equal to $(y_2 - y_1)^3 / 4y_1y_2$. **[05]**

b) Water in a rectangular channel 0.5m wide and 0.15m deep is flowing with Froude No. 2.5. Find : **[05]**

- i)** The specific energy head.
- ii)** The critical depth.
- iii)** The sequent depth.
- iv)** The head loss due to hydraulic jump.

OR

a) What are the assumptions in the theory of hydraulic jump? **[05]**

b) A sluice gate discharges water into horizontal channel with velocity of 8m/s and the depth of flow is 0.8m. Determine the depth of flow after the jump and loss of head. **[05]**

P.T.O.

- Q.4 a)** State and explain types of unsteady flow. [05]
b) What are surge tank? Explain its functions. [05]

OR

- a)** What are the assumptions made in rigid water column theory? [05]
b) What is water Hammer phenomenon? [05]

- Q.5 a)** What is skin friction drag and pressure drag? [05]
b) A 15mm diameter cable stretches between two towers 200m apart. Find force exerted by wind flowing at 15 kmph perpendicular to cable. $\gamma_{\text{air}} = 12 \text{ kN/m}^3$
 $C_d = 1.5$. [05]

OR

- a)** Enlist four practical problem involving fluid flow around submerged bodies. [05]
b) A $1.5\text{m} \times 1.5 \text{ m}$ plate is moving in stationary air at 25 kmph. Find lift and drag and resultant forces. Take air density 1.1 kg/m^3 $C_d = 1.15$ and $C_l = 0.75$. [05]

- Q.6 a)** What is volumetric efficiency and overall efficiency in case of hydraulic turbine? [05]
b) A jet of water 15cm diameter strikes a flat plate normally with a velocity of 5m/s. The plate is moving with velocity 2m/s in direction of jet. Find force exerted by jet on the plate and work done. [05]

OR

- a)** Why priming is necessary in case of centrifugal pump? [05]
b) A Pelton wheel develops 4000 kw under a head of 110m and runs at 215 rpm. Assume $C_v = 0.98$, $\phi = 0.46$, jet diameter to wheel diameter ratio = $d/D = 1/5$. Determine flow required and no. of jets required. Take $\eta_o = 89\%$. [05]

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