

B.Tech. SEM -V (Civil) 2014 Course (CBCS) : SUMMER - 2019

SUBJECT : ADVANCED MECHANICS OF FLUID

Day : Wednesday

S-2019-2653

Time 10.00 AM TO 01.00 PM

Date : 15/05/2019

Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

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- Q.1** a) Explain in brief velocity distribution in open channel. (05)
- b) Design most economical rectangular channel to convey discharge of $1.5 \text{ m}^3/\text{sec}$ with a bed slope of 1 in 1000 and $n = 0.002$. (05)
- OR**
- a) Explain factors affecting Manning's roughness constant. (05)
- b) Find velocity of flow and rate of flow of water through a rectangular channel 8 m wide and 2 m deep. The channel is having bed slope of 1 in 2000. Take $C = 50$. (05)
- Q.2** a) What are basic assumptions in derivation of GVF equation (05)
- b) Draw and explain mild slope profiles. (05)
- OR**
- a) Derive different equation of GVF. (05)
- b) Draw and explain steep slope profiles. (05)
- Q.3** a) Write classification of Hydraulic jump based on Froude Number (05)
- b) In case of R.V.F. prove that, $y_1 + y_2 = 2 q^2 / gy_1 y_2$. (05)
- OR**
- a) A sluice gate discharges water into horizontal rectangular channel with velocity of 5 m/s and depth of flow 0.5 m. Determine depth of flow after hydraulic jump and consequent head loss. (05)
- b) What are practical application of Hydraulic Jump? (05)
- Q.4** a) What are types of unsteady flow? (05)
- b) Derive equation of motion for unsteady flow. (05)
- OR**
- a) What is water hammer phenomenon? (05)
- b) What are functions of surge tank? (05)
- Q.5** a) What are drag and lift forces? (05)
- b) Derive expression for drag and lift forces. (05)
- OR**
- a) What are types of drag? (05)
- b) What is streamlined and bluff body? (05)
- Q.6** a) Drive expression for force acting on curved stationary plate, when jet is striking at center of plate. (05)
- b) Show that maximum efficiency of undershot Wheel is 50%. (05)
- OR**
- a) What is hydraulic efficiency and mechanical efficiency of a turbine? (05)
- b) A Pelton wheel develops 8000kw of shaft power under a head of 300 m. Speed of rotation of wheel is 800 rpm and overall efficiency is 85%. Assuming $C_v = 0.98$, speed ratio = 0.45 and jet ratio = 11, find wheel diameter, the diameter of jet and number of jets required. (05)