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Code No. : 31002

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (Civil Engg.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016

Fluid Mechanics-II

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Distinguish between pipe flow and channel flow.
2. What are the factors that affect the friction in an open channel flow?
3. Explain briefly about a surge.
4. Indicate the relation among channel bed slope, channel water surface slope, and energy line slope in channels when flow is uniform?
5. Differentiate between streamlined body and bluff body.
6. What do you understand by boundary layer?
7. Distinguish between distorted and undistorted model.
8. Derive the scale ratios for velocity and discharge using Froude model law.
9. A farmer wants to increase the flow rate of existing single stage pump by replacing multi stage pump. Farmer is confused to go for series or parallel pump so he consulted you. What do you advice?
10. What is priming? Why it is required in pumps?

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) Derive Chezy's formulae for discharge through open channel flow and the flow is uniform.
b) A rectangular cross section channel is carrying maximum flow with its base of 10 m. The bed slope is 1 in 2000 along its flow. Find the maximum flow rate taking Manning's constant $N = 0.015$
12. a) Derive an expression for conjugate depths in terms of Froude's number for a hydraulic jump in a rectangular channel.
b) Find the slope of the free water surface in a rectangular channel of width 25 m having depth of flow 4 m. The discharge through the channel is $40 \text{ m}^3/\text{s}$. The bed of the channel is having a slope of 1 in 4000. Take Chezy's constant as 50.
13. a) Explain the methods to control boundary layer separation with neat sketches.
b) A car has a projected area of 3.5 m^2 . At a speed of 120 kmph it is encountered with total resistance of 1000 N. 15% of this is due to rolling friction at the wheel and 5% due to skin friction. The balance resistance is all due to the form drag. Determine the form drag coefficient.
14. a) State Buckingham pi theorem. What are the characteristics of repeating variables?
b) The velocity and flow over a model of spillway are 2 m/s and $3 \text{ m}^3/\text{s}$ respectively. Find out the velocity and discharge over a prototype which is 30 times the model size.

15. a) Discuss constant head characteristic curves of a turbine. What way they are useful in Hydel power station/turbine house.
- b) A centrifugal pump delivers water against a net head of 14.5 m and a design speed of 1000 rpm. The vanes are curved back at an angle of 30° with the periphery. The impeller diameter is 30 cm and outlet width is 5 cm. Determine the discharge of the pump if manometric efficiency is 95%.
16. a) Explain in detail with neat sketches the pressure and velocity distribution in an open channel flow.
- b) Derive the expression for a dynamic equation for gradually varied flow.
17. Write short notes on any *two* of the following:
- Displacement thickness.
 - Omitted and superfluous variables.
 - Specific speed of a turbine.

