

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2018**

Subject Code: 2160602

Date: 01/05/2018

Subject Name: Applied Fluid Mechanics

Time: 10:30 AM to 01:00 PM

Total Marks: 70

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) What is open channel? Why bed slope is provided in open channel?	<b>03</b>
	(b) Explain various types of open channels with sketch.	<b>04</b>
	(c) What do you mean by most economical channel section? Derive the condition for trapezoidal channel of best section.	<b>07</b>
<b>Q.2</b>	(a) What is specific energy head? Draw specific energy diagram.	<b>03</b>
	(b) Explain under what condition hydraulic jump can occur.	<b>04</b>
	(c) A concrete lined trapezoidal channel has to discharge 600 cumecs. The side slopes are 1 in 1 and the bed slope is 1 in 4000. The permissible velocity is 2.5 m/s. Determine the bottom width and the depth of the channel. Take Manning's $N = 0.014$	<b>07</b>
<b>OR</b>		
	(c) Derive the non uniform flow equation and explain back water curve and draw down curve.	<b>07</b>
<b>Q.3</b>	(a) Explain Hagen-Poiseuille theory.	<b>03</b>
	(b) Describe relation between shear stress and velocity gradient.	<b>04</b>
	(c) What is Couette flow? Derive an expression of velocity and shear stress for Couette flow	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Explain different types of shear theories for turbulent flow.	<b>03</b>
	(b) Write advantages and disadvantages of shear theories.	<b>04</b>
	(c) A rough pipe of 30 cm diameter carries water. If the mean point velocity and the velocity gradient at a distance of 3 cm from pipe wall are 2 m/sec and $12.5 \text{ sec}^{-1}$ respectively, determine the average height of roughness projection, wall shear stress, friction factor and mean velocity of flow. Take $\rho = 1000 \text{ kg/m}^3$ and $\kappa(\text{kappa}) = 0.4$	<b>07</b>

- Q.4** (a) What do you mean by pipes in series and pipes in parallel? **03**  
How the loss of head is determined in both systems.
- (b) Explain separation of boundary layer. **04**
- (c) Explain boundary layer theory and derive Karman's momentum equation for boundary layer. **07**

**OR**

- Q.4** (a) Explain the various types of similarities exist between model and its prototype. **03**
- (b) Explain Buckingham method of dimensional analysis **04**
- (c) Prove that the resistance  $F$  of sphere of diameter  $d$  moving at a constant speed  $v$  through a fluid of density  $\rho$  and dynamic viscosity  $\mu$  may be expressed as **07**

$$F = \frac{\mu^2}{\rho} \phi \left( \frac{vd\rho}{\mu} \right)$$

- Q.5** (a) Explain main components of a Pelton wheel. **03**
- (b) Describe component part of centrifugal pump and explain priming **04**
- (c) Explain performance characteristic curves for turbines with help of sketches **07**

**OR**

- Q.5** (a) Explain the working of a single stage centrifugal pump. **03**
- (b) Write short note on cavitation in turbine and pump **04**
- (c) Classify the different types of turbine and explain all in brief. **07**

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