

Roll No.

24196

B. Tech. 4th Semester (Civil Engineering)

Examination – May, 2011

FLUID MECHANICS - II

Paper : CE-204-F

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

- Note :** (i) Attempt *five* questions in all.
(ii) Question No. 1 is compulsory.
(iii) Attempt *one* question from each Section.
(iv) All questions carry equal marks.

1. Write short notes :

10 × 2 = 20

- (i) Aging of pipes
- (ii) Water Hammer
- (iii) Specific Energy
- (iv) Channel Transitions
- (v) Non-uniform flow
- (vi) Surge in open channels
- (vii) Pelton Turbine

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- (viii) Reaction Turbine
- (ix) Submersible pumps
- (x) Air lift pump

SECTION – A

2. (a) What do you understand by turbulent flow in pipe ? Explain Prandtl mixing length theory.
Show $v = \frac{v^*}{k} \log_e y + c$ where
 $c = v_{\max} - \frac{v^*}{k} \log_e R$ 10
- (b) Explain velocity distribution in Rough pipe. 10
3. (a) For the distribution main of a city water supply a 0.30 m main is required. As pipes above 0.25 m diameter are not available it is decided to lay two parallel mains of same diameter. Find the diameter of the parallel main. 15
- (b) Explain the terms hydraulic gradient & total energy lines. 5

SECTION – B

4. An irrigation channel of trapezoidal section, having side slopes 3 horizontal to 2 vertical is to carry a flow of $10 \text{ m}^3/\text{sec}$ on a longitudinal slope of 1 in 5000. The channel is to be lined for which the value of friction coefficient in manning's formula is $n = 0.012$. Find the dimensions of the most economic section of channel. 20

5. (a) Explain classification of channel bottom slopes in the various categories. 10
(b) Explain classification of surface profile. 10

SECTION – C

6. (a) Explain head & efficiencies of hydraulic turbines. 10
(b) Explain classification of turbine according to main flow direction of water & water flowing through the turbine runners & explain working principle of pelton wheel turbine. 10
7. The wing of an aeroplane is designed to develop a lift of 5×10^4 N. If the span is 10.5 m & the mean chord is 1.8 m, calculate the total drag at a speed of 400 km per hour. Assume elliptical lift distribution $\rho = 1.207$ kg/m³ and profile drag coefficient is 0.012. 20

SECTION – D

8. (a) At what height from water surface a centrifugal pump may be installed in the following case to avoid cavitation, atmosphere pressure 101 kpa, vapour 2.34 kpa, inlet and other losses in suction pipe 1.55 m, effective head of pump 52.5 m and cavitation parameter $\sigma = 0.118$. 10
(b) Explain principle of working & characteristic curve of centrifugal pump. 10
9. (a) Explain with Neat Sketches working principle of reciprocating pump & classification. 10

- (b) A double acting reciprocating pump having piston area 0.1 m^2 has a stroke 0.30 m long. The pump is discharging 2.4 m^3 of water per minute at 45 rpm through a height of 10 m . Find the slip of pump & power required to drive pump. 10
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