

B.Tech. Civil (Construction Management)**Term-End Examination****June, 2008****ET-540(B) : FLOW IN OPEN CHANNEL**

Time : 3 hours

Maximum Marks : 70

Note : Solve any five questions. Sketches and definition of symbols should form a part of your answer. Answer in your own words.

1. (a) Distinguish between bed slope, water surface slope, and energy slope in an open channel, using a sketch that is neatly drawn. 5
- (b) A rectangular channel, 5 m wide, carries a flow of $32 \text{ m}^3/\text{s}$ on a bed slope of 0.0015. Calculate the water surface slope at a section where $y = 2.3 \text{ m}$. Take $n = 0.014$, $\cos \theta = 1$, and $\alpha = 1$. 9
2. (a) In a G.V.F. situation, beginning from dy/dx (expressed as a function of S_o , S_p , α , Q , T , g and A) show :

$$\frac{dy}{dx} = S_o \frac{1 - (K_n / K)^2}{1 - (Z_c / Z)^2}$$

making suitable assumptions wherever necessary. 7

- (b) With respect to a uniform flow in a rectangular channel ($b = 2.5$ m, and $y = 1.5$ m), whose $n = 0.014$, find the convergence of the channel. 7
3. (a) Discuss the occurrence of S-profiles (S_1, S_2, S_3) in open channel flows, giving neat sketches. 5
- (b) A rectangular channel 5.5 m wide, has $S_0 = 0.0001$, and carries a flow at $y = 1.25$ m. If the channel terminates in an abrupt drop in its bed, what type of flow profile, upstream of the drop, is expected to form? Take $n = 0.015$. 9
4. (a) Define a hydraulic jump formed in an open channel. State the conditions under which it is formed in practice. 5
- (b) Describe, with the help of a sketch, how a jump can be located on a given mild channel. 9
5. Discuss in all details the theory and procedure of Bakhmeteff direct integration method of computing the water surface profile in an open channel. Give all the steps of calculations. 14
6. Explain the following : 7, 7
- (i) Hydraulic exponent for critical flow computations
- (ii) Hydraulic exponent for uniform-flow computation

7. Write short notes on any **four** of the following :

- (i) Uniform and varied flows
- (ii) Reynolds number
- (iii) Geometric elements of an open channel
- (iv) Manning's and Chezy's equations
- (v) Total energy and Specific energy
- (vi) Laminar and Turbulent flows

