(c) If the flow rate at the entrance of the constant width rectangular transition with bottom slope S_0 is equal to the critical depth y_{ci} then prove that the depth y in the transition is given by the equation.

$$S_0 x = y + 1yc^3 / 2yz - 3/2yc$$

5. Attempt only two parts of the following: 2×10=20

(a) Define and explain Hydraulic efficiency, Mechenical efficiency and overall efficiency in case of turbine. Derive the relationship among them?

(b) Explain with neat sketches the principles and working of Hydraulic lift, Hydraulic Crane, Hyraulic coupling, Hydraulic torque converter?

(c) Write a note on characteristics curve for rotodynamic pumps. A rotodynamic pump running at 1500 rpm discarges 120 litre per second against a head of 25 meter. If diameter of impeller is 250 mm and its width 50 mm find the vane angle at outer periphery. The monometric efficiency of pump is 75%.

—x—

Printed Pages : 4

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NCE-403

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100403

Roll No.

B. Tech. (IV Sem.)

SPL. THEORY EXAMINATION, 2014-15

HYDRAULICS & HYDRAULIC MACHINES

Time : 3 Hours] *[Total Marks : 100*

Note: Attempt all questions. All questions containing equal marks. If required any missing data then choose suitably.

1. Attempt any four parts of the following: 5×4=20

(a) Define Prismatic chanel, Hydraulic mean depth and Steady and steady Uniform open channel flow?

(b) What is Chezy's formulae? How it is Derived?

(c) Derive the expression for specific Force in Circular Channel Section?

(d) Deduce basic equation of continuity for unsteady Open Channel Flow?

(e) Show by the Manning's Formula that the average boundary shear stress is given by.

$$\tau_0 = \frac{pgn^2V^2}{R^{1/3}}$$

(f) Draw the Velocity Distribution Curve along the depth of Rectangular and circular channel?

2. Attempt any four parts of the following: 5×4=20

(a) What are the conditions for the trapezoidal channel of best section? Derive any one condition?

(b) What is the compound channel? How would you calculate the total discharge of the compound channel?

(c) A concrete lined circular channel of 3 m diameter has a bed slope of 1 in 5000. Determine the velocity of flow rate of maximum velocity and maximum discharge take Chezy's constant 50?

(d) Show that the hydraulic mean depth for rectagular channel is half of the depth of flow?

(e) Determine the normal depth in triangular channel with apex angle 90 degree when it carries a discharge of 1.5 m3/s at the slope of 0.0001. Take manning's n as 0.015?

(f) Draw a typical curve of specific energy and depth relationship and discuss?

3. Attempt only two parts of the following: 2×10=20

(a) Calssify the various flow profile with the help of their sketches?

(b) Define Back water curve and Draw down water curve? Derive an expression for the length of the back water curve in case of gradually varied flow?

(c) For a wide rectangular channel, derive expression for the channel bottom slope to be mild, steep and critical?

4. Attempt only two parts of the following: 2×10=20

(a) What is hydraulic jump? Discuss the use of hyraulic jump. Classify the hydraulic jump according to Froude number?

(b) A rectangular channel 3.0 m wide has flow of 3.8 M^3/sec with the velocity of 0.9 m/s. If the sudden release of additional flow at the upstream end of the channel causes the depth to raise by 50% determine the absolute velocity of resulting surge in new flow rate?