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

Paper ID : 2295003 Roll No.

B.TECH

Regular Theory Examination (Odd Sem-V), 2016-17

ENVIRONMENTAL HYDRAULICS

Time : 3 Hours *Max. Marks : 100*

Note : Attempt all Section. If require any missing data; then choose suitably.

SECTION - A

1. Attempt all question in breif. (10×2=20)

a) A rectangular c channel 3mtr wide carries a flow of 54m^3 /s .Find the critical velocity.

b) What do you understand Conservation of Momentum?

c) Named different type of Surge.

d) Determine the most economical cross section of width b and depth y carry 1000 liters of water per second with a bed slope of 1 in 500 Take N=0.022

e) What is the characteristic of jump on Sloping Floor.

f) Draw the figure of Weak Jump

g) What do you understand Deep Water waves?

h) Draw the figure of Volute Casing

i) What is the assumptions taken in velocity triangles?

j) Define Rotodynamic pump.

SECTION - B

2. Attempt any three of the following : (3×10=30)

a) A rectangular channel 2mtr wide carries 2.2m^3/s of water is subcritical uniform flow at a depth of 1 mtr what is lowest transeverse hump in the bottom Such that hc is the attained at the peak .

b) Integrate the differential equation of G.V.F. for a horizontal channel to get the profile.

$$x = \frac{h_C}{S_C}\left[\frac{\left(\frac{h}{h_C}\right)^{N-M+1}}{N-M+1} - \frac{\left(\frac{h}{h_C}\right)^{N+1}}{N+1}\right] + cons\tan t$$

c) An overflow spillway is 40mtr high at the design energy head of 205mtr over the spillway .Find the segment deoths and energy losses in a hydraulic jump formed as a horizontal apron at the toe of spillway . Neglecting the lossess due to flow over spillway face .Assume C_d =0.738

d) Show that hydraulic jump is non Rectangular channel, the specific force in the function of depth.

e) Explain

i) Cavitation in centrifugal Pump

ii) Priming of centrifugal Pump why it is necessary

SECTION - C

3. Attempt any one part of the following : (10×1=10)

a) What is critical depth ? derive the relation of specific energy and critical depth for Triangular Channels.

b) Derive the relationship for minimum size of Hump.

$$\frac{\Delta Z_C}{h_1} = \left(1 + F_1^2 - \frac{3}{Z} F_1^{3/2}\right)$$

4. Attempt any one part of the following : (10×1=10)

a) Compute the GVF differential equation By

i) Analytical Method ii) Graphical Method

b) Classify the hydraulic jump Based on Froude's Number . Draw the sketches.

5. Attempt any one part of the following : (10×1=10)

a) A rectangular channel carrying a super critical stream is to be provided with a hydraulic jump type of energy dissipater. It is desired to move an energy losses of 5 mtr in hydraulic jump when inlet Froude's Number is 8.5. What are the segment depths of this jump.?

b) Show the Celerity

$$C_s = \sqrt{gh}$$

6. Attempt any one part of the following : (10×1=10)

a) Classify the types of surge and define any one of them with neat sketch.

b) Define and Discuss the classification of river training and their Protection works.

7. Attempt any one part of the following : (10×1=10)

a) A centrifugal Pump discharge 0.15m^3 /s of water against a head of 12.5 mtr, The speed of impeller being 600rpm. The outer and inner diameter of the impeller are 500mm and 250mm respectively and the vanes are set back at 35^0 to the tangent at exist. If the area of flow remains 0.07m^3 /s from inlet to outlet Calculate:

i) Manometric efficiency

ii) Vane angle at inlet

iii) Work done by impeller on water per second

b) What is minimum starting speed of Centrifugal pump ? Defined with sketches characteristics Curves of centrifugal Pump.