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

PAPER ID : 23106 Roll No. | | | | | | | | | | |

B. Tech. Examination 2021-22

(Even Semester)

HYDRAULICS & HYDRAULIC MACHINE

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : $1 \times 8 = 8$

(a) Define rigid and mobile boundary channels with suitable example.

(b) Write the condition of most economic channel.

(c) Diffierentiate between notches and weirs.

(d) What are the advantages of hydraulic jump?

(e) Discuss the classification of turbines.

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(f) A river 150m wide and 4 m deep has an average bed slope of 0.0005. Calculate critical depth. Assume n= 0.035.

(g) What are static and manometric head?

(h) Give a brief note on cavitation problem in arial flow turbines.

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) The specific energy for a 5m wide rectangular channel is 6m. If the srate of flow of water through the channel is 20 m^3/s. Determine the alternate depth.

(b) Derive the condition for the trapezoidal channel of best section. Show that the hrdraulic mean depth for such a channel is one-half of the depth of flow.

(c) Derive the basic differential equation of gradually vareed flow. Also write the assumptions involved in GVF.

(d) What is turbine? Discuss its classification and give brief introduction on heads of turbines.

SECTION – C

Note:- Attempt all questions. Attempt any two parts from each questions. $5 \times 8 = 40$

3. (a) Define choking with the help of suitable example.

(b) Define an expression for critical energy for a triangular channel.

(c) The discharge of water through a rectangular channel of width 8m is $20m^3/s$. When the depth of flow is 4cm. Calculate :

(i) Specific energy

(ii) Critical depth and velocity

(iii) Minimum specific energy

4. (a) State Mannlong's equation. Derive Chezy's formula for uniform flow through an open channel.

(b) Show that hydraulically efficient triangular channel section has $h_e = y_e/2\sqrt{2}$.

(c) Find the velocity of flow and rate of flow of water through a rectangular channel 8m wide and 4m deep. When its running full. The channel is having bed slope of 1 in 2000. Take C-55. Also find the conveyance of the channel.

5. (a) A sluice gate discharges water into a harizontal rectangular channel with a velocity of 10m/s and depth of flow 1m. Determine the depth of flow after the jump and loss in total head.

(b) Briefly dicuss the direct step method for gradually varied flow computations.

(c) Discuss the methods of finding discharge for the compound section.

6. (a) What are the advantages of centrifugal pumps over displacements pumps? Discuss the various components of centrifugal pumps.

(b) A turbine is to operate under a head of 25m at a speed of 300rpm. The discharge is $12m^3/sec$. Assuming an efficency of 0.85. Calculate the power developed. What will be the specific speed, power, discharge and rotational speed at a head of 18m?

(c) A pelton wheel is having a mean bucket diameter of 1m and is running at 1000 rpm. The net head of pelton wheel is 700m. If the side clearance angle is 15° and discharge through nozle is $0.1m^3/s$, find

(i) Powel available at nozle

(ii) Hydraulic efficency of turbine

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