Code No: R22014   **R10**   SET - 1

II B. Tech II Semester Supplementary Examinations, November-2017
HYDRAULICS AND HYDRAULIC MACHINERY
(Civil Engineering)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Define specific energy of a flowing liquid. Explain with a neat sketch specific energy curve and how you arrive at the equations for critical depth and critical velocity. (7M)
   b) Find out the critical depth and velocity of flow in a channel of 10m width carrying a discharge of 50 m^3/sec. (8M)

2. a) With neat sketches explain the gradually varied flow profiles in an open channel flow. (4M)
   b) State and discuss the assumptions in the derivation of dynamic equation for Gradually Varied Flow. (4M)
   c) What do you understand by energy dissipation in hydraulic jump? Explain any two methods of energy dissipation. (7M)

3. A spillway of 6.2m high and 120m long discharges 2070 m^3/sec under a head of 5.2m.If 1:16 model of the spillway is to be constructed, find the model dimensions, head over the model and model discharge. (15M)

4. a) Derive an expression for the force exerted by a jet of water on a fixed vertical plate. (6M)
   b) A jet of water 6cm diameter strikes a stationery plate with a certain velocity. The jet is inclined at an angle of 65^0 with the plate. Find the velocity of the jet if the normal force exerted on the plate is 2.5 kN . (8M)

5. a) What are the functions of a draft tube. (5M)
   b) A Kaplan turbine under a head of 12m is developing 765kW of power and has 4m suction head at the turbine outlet. The turbine is installed at 1.5m above the tail race. Calculate the efficiency of the draft tube if the inlet diameter of tube is 1m and efficiency of turbine is 85%. (10M)

6. a) What is the geometric similarity in turbines? (5M)
   b) Define unit speed, unit discharge and unit power. (6M)
   c) What is "specific turbine'? How specific quantities are are useful in turbines? (4M)

7. Write explanatory notes on: (i)Effeciency of centrifugal pump (15M)
   (ii)Pumps in parallel and in series
   (iii)Characteristic curves of centrifugal pump.

8. a) Explain the terms load factor, utilization factor and capacity factor of a Hydroelectric plant. (6M)
   b) Determine the firm power generated at a run off river plant with the following data Discharge = 13 m^3/sec, Head at the plant =8m, Efficiency of the system = 87% (9M)