Q.P. Code: 16CE113 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations Dec 2019

HYDRAULICS & HYDRAULIC MACHINERY

(Civil Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	The discharge of water through a rectangular channel of width 8m is 15m3/sec. When the depth of flow of water is 1.2m. Calculate: (i) specific energy of the flowing water (ii) critical depth and critical velocity (iii) value of minimum specific energy.	**8M**
	b	Derive an expression for maximum velocity of flow through a circular section.	**4M**
		OR	
2	a	Write a brief note on channel transition with reduction in width of a rectangular channel with neat sketch.	**7M**
	b	Determine the expression for the most economical trapezoidal section in terms of side slope.	**5M**

UNIT-II

3	a	A hydraulic jump forms at the downstream end of spillway carrying 17.93 m3/s discharge. If depth before jump is 0.80 m, determine the depth after the jump and energy loss.	**6M**
	b	What are the applications of hydraulic jump?	**6M**
		OR	
4	a	Derive an expression for hydraulic jump in rectangular channel.	**6M**
	b	What are assumptions of gradually varied flow? Derive the Dynamic equation of gradually varied flow.	**6M**

UNIT-III

5		A jet of water of diameter 7.5 cm strikes a curved plate at its center with a velocity of 20 m/sec. The curved plate is moving with a velocity of 8m/sec in the direction of the jet. The jet is deflected through an angle of 165 degree. Assuming the plate smooth find (i) force exerted on the plate in the direction of jet (ii) power of the jet (iii) efficiency of the jet	**12M**
		OR	
6		A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45 degrees to the axis of the jet. Calculate the normal pressure on the plate. (i) When the plate is stationary and (ii) When the plate is moving with a velocity of 15 m/s and away from the jet. Also determine the power and efficiency of the jet when the plate is moving.	**12M**

UNIT-IV

7 a What is a turbine and give the classification in detail? Give the various efficiencies. 7M

b Explain Radial flow reaction turbine with a neat diagram. 5M

OR

8 The three-jet Pelton turbine is required to generate 1000 kW under a net head of 400 m. The blade angle at outlet is 15 degrees and the reduction in the relative velocity while passing over the blade is 5%. If the overall efficiency of the wheel is 80%, Cv=0.98 and speed ratio =0.46, then find (i) The diameter of jet (ii) Total flow in m3/sec and the force exerted by a jet on the buckets. If the jet ratio is not less than 10, find the speed of the wheel for a frequency of 50 hertz/sec and the corresponding wheel diameter 12M

UNIT-V

9 a The internal and external diameter of an impeller of a centrifugal pump which is running at 1000 r.p.m. are 200 mm and 400 mm respectively. The discharge through pump is 0.04m3 /sec and velocity of flow is constant and equal to 2 m/sec. The diameters of suction and delivery pipes are 150 mm and 100 mm respectively and suction and delivery heads are 36 m and 30 m of water respectively. If the outlet vane angle is 450 and power required to drive the pump is 16.186 KW, determine: (i) Vane angle of impeller at inlet (ii) Overall efficiency of the pump and (iii) Manometric efficiency of pump. 7M

b What it is meant by priming? 5M

OR

10 a A centrifugal pump discharges 0.15 m3/sec of water against a head of 12.5 m, the speed of impeller being 600 r.p.m. The outer and inner diameter of impeller are 500 mm and 250 mm respectively and the vanes are bent back at 350 to the tangent at exist. If the area of flow remains 0.07 m2 from inlet to outlet, calculate (i) Manometric efficiency of pump (ii) Vane angle at inlet (iii) Loss of head at inlet to impeller when the discharge is reduced by 40% without changing the speed. 7M

b What are similarity laws? 5M