Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2151903 **Date:30/04/2018**

Subject Name:Fluid Power Engineering

Time:02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Classify hydropower plants according to availability of head.	**03**
	(b)	Discuss various factors for selecting a site for hydropower plant.	**04**
	(c)	Prove that the velocity of the vanes should be half the velocity of jet for maximum efficiency for a series of flat vanes held normal to the axis of the jet.	**07**
Q.2	**(a)**	What do you understand by hydraulic machines? Discuss impulse momentum equation as applied to these machines.	**03**
	(b)	A jet of water 5 cm diameter moving at a velocity 30 m/s impinges on a symmetrical curved fixed plate at its centre. Find the force exerted by jet in the direction of jet. The jet is deflected through angle of 130^0 at the outlet of curved plate.	**04**
	(c)	Explain principle of jet propulsion.	**07**
		OR	
	(c)	Find the force exerted by a jet on moving curved vane when jet strikes the vane at its one end tangentially.	**07**
Q.3	**(a)**	Explain different types of draft tubes.	**03**
	(b)	Write a short note on: Cavitation in reaction turbines and its control.	**04**
	(c)	A pelton wheel is required to develop 8421 kW of shaft power under a head of 320 m at a speed of 700 rpm. Assuming following data: Coefficient of velocity jet = 0.98, Speed ratio = 0.45, jet ratio = 6 and overall efficiency = 87 %, Calculate: (i) The wheel diameter, (ii) the diameter of the jet and (iii) the number of jets required.	**07**
		OR	
Q.3	**(a)**	Give comparison between impulse turbine and reaction turbine.	**03**
	(b)	Explain various types of impellers used in centrifugal pump.	**04**
	(c)	A Kaplan turbine develops 15000 kW power with a head of 30 m. Hub diameter of runner is 0.35 times the outer diameter of runner. Find the diameter of the runner, rotational speed of turbine and Specific speed. Take the speed ratio 2.0, flow ratio 0.65 and overall efficiency 90%.	**07**
Q.4	**(a)**	Explain the terms: Available NPSH and Required NPSH	**03**
	(b)	A single acting reciprocating pump has a plunger diameter of 250 mm and its stroke is 300 mm. The pump runs at a speed of 60 rpm and delivers 14 litres/s of water. Find the theoretical discharge in litres/s, coefficient of discharge and percentage slip.	**04**
	(c)	Explain performance characteristic curves of the centrifugal pump.	**07**

OR

Q.4	**(a)**	What are the advantages of multistage compression?	**03**
	(b)	What is an air vessel and why it is needed to be fitted in pipes of a reciprocating pump?	**04**
	(c)	With the help of velocity triangles discuss salient features of radial, backward and forward curved vanes in a centrifugal compressor.	**07**
Q.5	**(a)**	What is the purpose of a hydraulic accumulator and where they are used?	**03**
	(b)	For a single stage air compressor having pressure ratio 10 from an initial pressure 1 bar, swept volume 14 litres and index of compression 1.3, find the power required and rotational speed in rpm. Free air delivery is 3.1 m^3/min. Neglect clearance.	**04**
	(c)	With neat sketch explain construction and working of hydraulic press.	**07**

OR

Q.5	**(a)**	Why centrifugal compressors are not suitable for aircraft applications?	**03**
	(b)	With suitable sketch explain the working principle of an axial flow compressor.	**04**
	(c)	With neat sketch explain construction and working of hydraulic intensifier.	**07**

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