Vivekananda College of Engineering & Technology, Puttur
[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]
Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08	Rev 1.10	ME	14/11/2022

CONTINUOUS INTERNAL EVALUATION - 1

Dept: ME	Sem / Div: 5th A	Sub: Turbo machine	S Code: 18ME54
Date:22/11/2022	Time:3:00-4:30 pm	Max Marks: 50	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

QN		Questions	Marks	RBT	CO's
		PART A			
1	a	Calculate the diameter and output of second turbine for the following data. Assume efficiency of both is same. Turbine 1: P = 25kW, D = 0.5m, N = 1000rpm, H = 20m & Turbine 2: N = 200rpm, H = 160m.	9	L3	CO1
	b	An output of 10kW was recorded on a turbine with 0.5 diameter revolving at a speed of 800rpm under a head of 20m. What is the diameter and output of another turbine which works under a head of 180m & 200rpm, when their efficiencies are same. Find the specific speed & name the turbine can be used.	8	L3	CO1
	c	Explain significance of π - Terms	8	L2	CO1
		OR			
2	a	A Francis turbine is built to a scale of 1:5. Model: P = 4kW, N = 350rpm, H = 2m and Prototype: H = 6m. Find Power output and Speed of prototype. Assume overall efficiency of the model is 70%.	9	L3	CO1
	b	A model of a turbine built to a scale of 1:4 is tested under a head of 10m. The prototype has to work under a head of 50m at 450rpm. What speed should the model run if it develops 60kW using 0.9 cumecs at this speed? What power will be obtaining from the prototype assuming that its efficiency is 3% greater than model?	8	L3	CO1

	c	List and Explain any 3 laws of similitude	8	L2	CO1
		PART B			
3	a	Derive an expression for Euler's turbine equation.	9	L3	CO2
	b	The velocity of steam outflow from a nozzle in a De-Laval turbine is 1200m/sec. The nozzle angle is 22°. If the rotor blades are equiangular and the rotor tangential speed is 400m/sec. Calculate the rotor angles, Tangential force on the blade ring and the power output. Assume relative velocities remain constant. Also find utilization factor.	8	L3	CO2
	c	Define degree of reaction & draw velocity triangles for different values of R.	8	L2	CO2
		OR			
4	a	Derive an expression for ε_{max} for a turbo machine & apply the general equation for Impulse and reaction turbines.	9	L3	CO2
	b	At a nozzle exit of a steam turbine the absolute steam velocity is 300m/sc. The rotor speed is 150m/sec at a point where the nozzle angle is 18°. If the outlet rotor blade angle is 3.5° less than that of inlet blade angle, find the output from the stage for a steam flow rate of 8.5kg/sec. assume constant relative velocity. Find the utilization factor.	8	L3	CO2
	c	Derive an expression for ϕ_{opt} for Impulse & reaction turbine	8	L3	CO2

Prepared by: 15/11/22

HOD