Sanjay Ghodawat University, Kolhapur

2020-21

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EXM/P/09/00

Year and Program: S.Y. B. Tech.	**School of Technology**	**Department: Aeronautical Engineering**
Course Code: AET207	**Course Title: Fluid Mechanics**	**Semester : III**
Day : **Date :**	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All Questions are compulsory.

2) Missing data may be assumed suitably with justification

			Marks	Bloom's Level	CO
Q.1	**Answer/Solve the following [(a) is compulsory and solve any one from (b)]**				
	a)	Define i) Fluid Mechanics ii) Surface tension iii) Capillarity iv) Cavitation v) Viscosity vi) Pascal's law	8	1	1
	b)	10 m^3 of mercury weighs 136 x 10^4 N. Calculate mass density, weight density, specific volume and specific gravity.	8	3	1
		OR			
		Calculate the capillary rise or capillary fall in mm in a glass tube of 4 mm diameter, when immersed in i) water ii) mercury. Take density of water as 1000 kg/m^3, surface tension of water and mercury in contact with air as 0.0736 N/m and 0.51 N/m respectively and angle of contact for water as zero and that for mercury as 128^0.	8	3	2
Q.2	**Answer/Solve the following [(a) is compulsory and solve any one from (b)]**				
	a)	Explain major losses and minor losses in flow through pipe.	8	2	3
	b)	There is horizontal crack 40 mm wide and 2.5 mm deep in a wall of thickness 100 mm. Water leaks through the crack. Find the rate of leakage of water through the crack if the difference of pressure between the two ends of the crack is 0.03 x 10^{-4} N/mm^2. Take the viscosity of water as 0.001 Ns/m^2.	8	3	3
		OR			
		Derive on the basis of dimensional analysis suitable parameters to present thrust developed by a propeller, Assume that the thrust (P) depends on the angular velocity (ω), speed of advance (V), diameter (D), dynamic viscosity (μ), mass density (ρ) and elasticity of the fluid medium which can be denoted by speed of sound in the medium (C).	8	3	4

Q.3 Answer/Solve the following [(a) is compulsory and solve any one from (b)]

a)	Explain the working of Francis turbine with a neat sketch.	9	2	5
b)	Calculate the diameter of parachute to be used for dropping an object of mass 100 kg so that the maximum terminal velocity of dropping is 5 m/s. The drag coefficient for parachute, which may be treated as hemispherical is 1.3. The density of air is 1.15 kg/m^3.	9	3	5
	OR			
	Francis turbine has the following data. Net head H = 60 m, speed N = 700 RPM, Shaft power P = 294.3 kW, $\eta_{overall}$ = 84 %, $\eta_{hydraulic}$ = 93 %, Breadth ratio = 0.1, Flow ratio = 0.2, outer radius of the runner = 2x inner radius of the runner. The thickness of the vane occupies 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine i) Guide blade angle ii) Runner blade angles at inlet and outlet iii) Diameters of runner at inlet and outlet and iv) Width of wheel at inlet.	9	3	5

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