Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)

Course Code: MPT203
Course Name: FLUID MECHANICS AND MACHINERY

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1	State Newton's law of viscosity. What are Newtonian fluids?	(3)
2	What do you mean by compressible and incompressible fluids?	(3)
3	How a differential manometer differ from simple manometer.	(3)
4	Explain the term metacenter and metacentric height.	(3)
5	What is the difference between laminar and turbulent flow?	(3)
6	Explain the phenomenon of water hammer.	(3)
7	What are the design features of a Pelton wheel?	(3)
8	Define specific speed of a turbine.	(3)
9	State slip, percentage slip and negative slip of a reciprocating pump.	(3)
10	What is the need of priming in a centrifugal pump?	(3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11	a) What is capillarity? Derive an expression for capillary rise in a tube.	(8)
	b) Calculate density, specific gravity, weight of 2 litre of petrol of specific gravity 0.7.	(6)
12	a) Explain the terms compressibility, bulk modulus and vapour pressure.	(6)
	b) The dynamic viscosity of oil used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4m and rotates at 190rpm. Calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of oil film is 1.5mm.	(8)

Module 2

13 a) State and explain hydrostatic law. (7)

b) The right limb of a simple U-tube manometer containing mercury was open to atmosphere while left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The centre of the pipe is 14cm below the level of mercury in right limb. Find the pressure of fluid in the pipe, if the difference of mercury level in the two limbs was 18cm. (7)

14 a) With the help of neat sketch, explain the working of Bourdon pressure gauge. (6)

b) A rectangular plane surface is 2m wide and 3m deep. It lies in vertical plane in water. Determine the total pressure and centre of pressure on the plane surface when its upper edge is horizontal i) coincides with water surface ii) 2.5 meter below of free water surface. (8)

Module 3

15 a) Derive the Bernoulli's equation. (7)

b) A 35cm diameter pipe, conveying water, branches in to two pipe lines of diameter 20cm and 15cm respectively. If the average velocity in the 35cm diameter pipe is 2.5m/s. Find the discharge in this pipe. Also determine the velocity in 15cm diameter pipe, if the average velocity in 20cm diameter pipe is 2m/s. (7)

16 a) Derive Darcy-Weisbach for energy loss due to friction in a circular pipe when the flow is turbulent. (7)

b) A pipe of diameter 300mm and length 3500m used for transmission of power by water. The total head at the inlet of the pipe is 500m. Find the maximum power available at the outlet of the pipe if the value of Darcy's friction coefficient f is 0.006. (7)

Module 4

17 a) With a neat sketch, derive the expression for discharge through an orificemeter. (7)

b) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat diameter 10cm. The oil- mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through horizontal venturimeter. Take coefficient of discharge as 0.8. (7)

18	a) How are turbines classified in general? Describe in detail about the different classifications.	(6)
	b) Discuss the constructional features and working of a Kaplan turbine with neat sketch of the entire unit and parts.	(8)

Module 5

19	a) With the help of an indicator diagram, explain the effect of acceleration in a reciprocating pump	(7)
	b) Derive an expression for the speed of a centrifugal pump.	(7)
20	a) Explain the working of a reciprocating pump with air vessels.	(7)
	b) Describe the efficiencies and heads of a centrifugal pump.	(7)

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