

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), FEBRUARY 2022

(2020 SCHEME)

Course Code: 20MET283

Course Name: Fluid Mechanics and Machinery

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

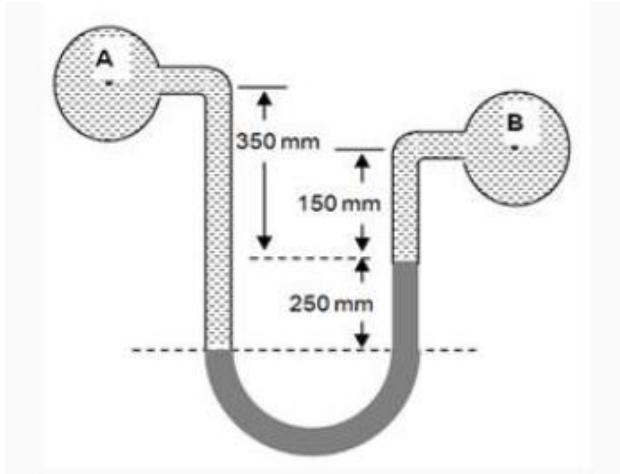
1. Derive the S.I unit for dynamic viscosity.
2. What is capillary action?
3. Define gauge pressure.
4. Differentiate between Rotational and Irrotational flows
5. Draw a neat sketch of a Pitot tube and label the parts.
6. Explain Notches and Weirs.
7. What is Cavitation?
8. What is an Impulse turbine?
9. What are positive displacement pumps?
10. Why air vessels are needed in a reciprocating pump?

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) A U-tube mercury differential manometer is connected to two pipes at A and B. Pipe A Contains oil of Specific Gravity 0.92 and pipe B is carrying water. If the pressure at point A is 125 kN/m^2 find the pressure at point B.



(8)

- b) A simple U-tube manometer is installed across an orificemeter. The manometer is filled with mercury (sp. gravity = 13.6) and the liquid above the mercury is carbon tetrachloride (sp. gravity = 1.6). The manometer reads 200 mm. What is the pressure difference over the manometer in newtons per square metre. (6)

OR

12. a) Explain the following properties of Fluids and state their units in S.I. (8)
- Specific volume
 - Weight density
 - Kinematic viscosity and
 - Mass density
- b) Differentiate between Newtonian and Non-Newtonian fluids. (6)

MODULE II

13. a) With neat sketches explain different types of Manometers. (10)
- b) State Pascal's law. (4)

OR

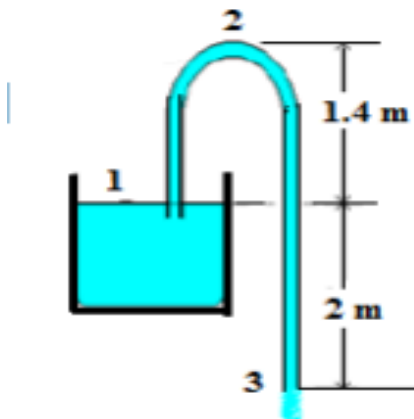
14. a) A circular plate 1.5 m diameter is submerged in water, with its greatest and least depths below the surface being 2 m and 0.75 m respectively. Determine: (i) (8)
The total pressure on one face of the plate, and (ii) The position of the centre of pressure.
- b) Write a note on (6)
- Atmospheric pressure
 - Absolute pressure
 - Vacuum pressure

MODULE III

15. a) Derive Hagen Poiseuille equation. (8)
- b) What is water hammering? (6)

OR

16. a) The pipe of a syphon has 50 mm diameter and discharges water to the atmosphere, as shown in figure. Neglect all possible losses. (10)



- Determine,
- the velocity of flow.
 - the discharge.
 - the absolute pressure at the point 2.

- b) A pipe of 2 m diameter and 15 km long transmits water of velocity of 1 m/sec. The friction coefficient of pipe is 0.005. Calculate the head loss due to friction? (4)

MODULE IV

17. a) With a neat sketch, explain the working of Pelton Turbine. (10)
b) What are the functions of a draft tube? (4)

OR

18. a) The hub diameter of a Kaplan turbine, working under a head of 10 m, is 0.30 times the diameter of the runner. The turbine is running at 100 r.p.m. If the vane angle of the extreme edge of the runner at outlet is 15° and flow ratio 0.6, find: (i) Diameter of the runner, (ii) Diameter of the boss, and (iii) Discharge through the runner. Assume velocity of whirl at the outlet as Zero. (10)
b) Differentiate between Speed ratio and Jet ratio. (4)

MODULE V

19. a) A double –acting reciprocating pump running at 40 r.p.m is discharging 1.0 m^3 of water per minute. The pump has a stroke of 400mm, the diameter of the piston is 200mm. The delivery and suction head are 20m and 5m respectively. Find the slip of the pump and power required to drive the pump. (6)
b) With the help of a neat sketch, Explain the constructional features of a Centrifugal pump. (8)

OR

20. a) With the help of neat sketch, explain the working of a reciprocating pump. (10)
b) Calculate the discharge of reciprocating pump (single acting) if area of cylinder is 0.25 m^2 , length of stroke is 0.15 m, number of cylinder =1 and speed of pump is 50 rpm. (4)
