Hall Ticket No | | | | | | | | | | | Question Paper Code: ACEB06

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020

Regulation: IARE–R18

FLUID MECHANICS

Time: 2 Hours   (CE)   Max Marks: 70

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. How are fluids classified based on Newton laws of viscosity? Differentiate adhesion and cohesion. **[5M]**

2. Write short notes on i) Buoyancy ii) Meta centre iii) Center of gravity **[5M]**

3. Determine the equation for measuring the total pressure and centre of pressure on the horizontal plane surface of a body with a neat sketch. **[5M]**

4. How do you distinguish sharp crested weir from a broad crested weir? **[5M]**

5. Explain about dimensional homogeneity and similarity law. **[5M]**

6. Classify different types of flow patterns along with examples. **[5M]**

7. Explain the importance of micro manometers in measuring the pressure of a liquid? **[5M]**

8. Briefly explain about velocity potential function and stream function with equations. **[5M]**

PART – B

9. Write short notes on the following along with units in different types of systems i) Mass density ii) Viscosity iii) Surface tension iv)Pascal's law **[10M]**

10. The dynamic viscosity of the oil used for lubrication between a shaft and sleeve is 6 poise. The shaft is of 0.4 m diameter and rotates at 190 RPM. Calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of oil film is 1.5mm **[10M]**

11. A hydraulic press has a ram of 30cm diameter and a plunger of 4.5cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500N. **[10M]**

12. Prove that the pressure remains equal in all the directions when the liquid is at rest. **[10M]**

13. What are the characteristics of rotational and irrotational flows? Also distinguish with mathematical expressions. **[10M]**

14. The diameters of a pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe section 1 is 5 m/s. Determine also the velocity at section 2 **[10M]**

15. A horizontal venturimeter with inlet diameter 20cm and throat diameter 10cm is used to measure the flow of oill of specific gravity 0.8. The discharge oil through venturimeter is 60 lit/sec. Find the reading of oil –mercury differential manometer. Take C_d=0.98 **[10M]**

16. Deduce the Bernoulli's equation from Euler's equation. **[10M]**

17. Elaborate the procedure for solving problems by Buckingham's 'π' theorem. **[10M]**

18. A pipe of diameter 1.5m is required to transport an oil of specifi gravity 0.9 and viscosity 3×10^{-2} poise at the rate of 3000lit/s. tests were conducted on a 15cm diameter pipe using water at 20° C. Find the velocity and rate of flow in the model. Viscosity of water at 20° C =0.01poise. **[10M]**

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