KATHMANDU UNIVERSITY
End-Semester Examination
February/March, 2018

Marks Scored:

Level : B.Tech.
Year : II

Course : MEEG 218
Semester : I

Exam Roll No.:

Time: 30 mins.

F.M. : 20

Registration No.:

Date : MAR 15 2018

SECTION "A"
[20 Q. × 1 = 20 marks]

Tick the most appropriate answer.

1. Hydraulics is the branch of fluid mechanics which deals with
   [ ] fluids that undergo significant density changes
   [ ] liquid flows in pipes and open channels
   [ ] naturally occurring flows
   [ ] flow of gases over bodies such as aircraft

2. Specific weight of a fluid represents
   [ ] weight of fluid per unit volume
   [ ] ratio of mass density of fluid to the mass density of a standard fluid
   [ ] reversed of the mass density
   [ ] prevent governor exceed limits

3. Which of the following is not a non-Newtonian fluid
   [ ] milk
   [ ] thick lubricating oil
   [ ] thin lubricating oil
   [ ] blood

4. Formation of bubbles in water turbine is the effect due to
   [ ] vapor pressure
   [ ] surface Tension
   [ ] meniscus effect
   [ ] capillary effect

5. Pressures below atmospheric pressure is measured as
   [ ] gage pressure
   [ ] absolute pressure
   [ ] vacuum pressure
   [ ] both absolute and vacuum pressure

6. The buoyant force acting on a submerged body is equal to
   [ ] the mass of the liquid displaced by the body
   [ ] the volume of the liquid displaced by the body
   [ ] the weight of the liquid displaced by the body
   [ ] the CG of the liquid displaced by the body

7. Pressure distribution along a vertical surface immersed in fluid is given by
   [ ] volume of fluid in contact
   [ ] area of fluid in contact
   [ ] rectangular profile
   [ ] triangular profile

8. Which of the following is not the desirable property of a manometric liquid
   [ ] low viscosity
   [ ] high vapor pressure
   [ ] negligible surface tension
   [ ] low thermal expansion

9. Devices used for velocity measurement of fluid through small pipes
[ ] weirs [ ] notches [ ] pitot [ ] orifice

10. Mach number is used to classify the flow as
[ ] single phase vs. multiphase flow [ ] incompressible vs. compressible flow
[ ] homogeneous vs. heterogeneous flow [ ] isothermal vs. adiabatic

11. The Bernoulli's equation is derived from the principle of
[ ] law of conservation of matter [ ] law of conservation of energy
[ ] law of conservation of energy [ ] all of above

12. At the boundary layer the velocity of fluid flow is expected be _____ of free flow
[ ] 97 % [ ] 98 % [ ] 99 % [ ] 100 %

13. The component of the total force in the direction of motion is called
[ ] drag force [ ] lift force [ ] tangential force [ ] normal force

14. The most efficient angle of attack for an flying airplane is
[ ] 15^0 [ ] 14^0 [ ] 5^0 [ ] 4^0

15. Normalized equation means
[ ] the equation having the same dimensions in additive terms
[ ] the equation rendered to non-dimensional by dividing each additive terms by a same parameter
[ ] the equation with the non-dimensional terms in the of order unity
[ ] the equation with dimensional homogeneity

16. Which of the following is not the part of CFD process
[ ] geometry description
[ ] specification of boundary conditions
[ ] parameterization
[ ] flow solution

17. A U-tube manometer measures
[ ] absolute pressure at a point
[ ] local atmospheric pressure
[ ] difference in total energy between two points
[ ] difference in total pressure between two points

18. A flow in which flow conditions do not change with time at any point is called
[ ] uniform [ ] steady [ ] laminar [ ] turbulent

19. Which of the following is not a dimensionless parameter
[ ] Reynolds number [ ] friction factor
[ ] kinematic viscosity [ ] pressure coefficient

20. Property of fluid by which its own molecule are attracted is called
[ ] adhesion [ ] cohesion [ ] surface tension [ ] viscosity

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F.M. : 40

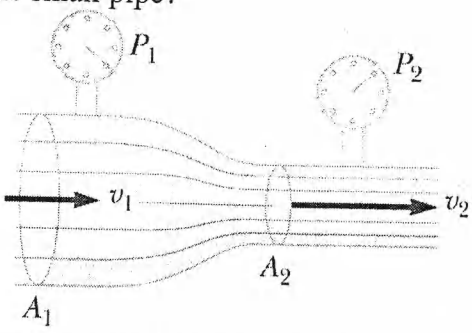
SECTION "B"
[5 Q.×8 = 40 marks]

Attempt *ALL* questions.

Q.N.1

a) Explain the effects of viscosity on the Newtonian and non-Newtonian fluids. [3]

b) A large pipe carries water with a very slow velocity and empties into a small pipe with a high velocity as shown in the Figure. If P_2 is 7000 Pa lower than P_1, what is the velocity of the water in the small pipe? [5]



c) Discuss the differences in pressure distribution in horizontal and vertical submerged surfaces [3]

Q.N.2

a) Discuss the properties and applications of streamlines. [3]

b) What are the different methods of flow measurements commonly applied the fluid flow applications. Discuss the principle of flow measurement by orifice meter. [2+3]

c) Discuss the condition of stability of submerged body. [3]

Q.N.3

a) Discuss the formation and characteristics of boundary layer growth in flat plate. [3]

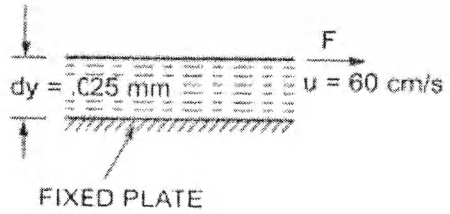
b) Discuss the different methods of flow visualization techniques. [5]

c) Draw the diagram to show the development of steady flow in a pipe. [3]

Q.N.4

a) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U-tube manometer is 100 mm take sp. gr of oil to be 0.8. [3]

b) A plate 0.025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2 N/m^2 to maintain this speed as shown in the Figure. Determine the fluid viscosity between the plates. [5]



c) Discuss how lift and drag are developed in an airfoil [3]

Q. N. 5

a) With example discuss dimensional homogeneity and its application? [3]

b) Explain the steps followed for the dimensional analysis using Buckingham's Π-theorem. [5]

c) Differentiate between static and dynamic head. [3]