Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Level : B. Tech.
Year : II

Course : MEEG 218
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date 09 JUNE 2019

SECTION "A"
[20 Q. × 1 =20 marks]

Choose and mark 'X' in the most appropriate answer.

1. When a constant shear force is applied to a fluid,
   [ ] it never stops deforming.
   [ ] it deforms only after a limiting force.
   [ ] it stops deforming after maximum shear angle.
   [ ] it assumes a deformed shape as long as the same force is applied.

2. Which of the following signifies to the control volume?
   [ ] fixed volume in space [ ] arbitrary volume in space
   [ ] fixed mass in system [ ] fixed volume in system

3. Specific gravity of a liquid being is 13.6 implies
   [ ] its weight is 13.6 times heavier than water
   [ ] its mass is 13.6 times heavier than water
   [ ] its weight and mass is 13.6 times heavier than water
   [ ] its volume is 13.6 times heavier than water

4. Fluid friction phenomenon is closely related to
   [ ] Vapor pressure [ ] Surface Tension [ ] Capillary effect [ ] Viscosity

5. Which of the following statements about the buoyancy is true?
   [ ] the buoyant force acting on a body immersed in a fluid is equal to the weight of the fluid displaced by the body
   [ ] the tendency of the body to be lifted upward in a fluid due to buoyant force is called buoyancy
   [ ] the line of action of the buoyant force is vertical and passes through the centroid of the displaced fluid
   [ ] all of the above

6. Which device are used for velocity measurement of fluid through an open channel flow?
   [ ] Weir [ ] Ventry meter [ ] Orifice meter [ ] Pitot tube

7. The flow at constant rate through a nozzle is
   [ ] steady uniform flow [ ] non-steady uniform flow
   [ ] non-steady and non-uniform flow [ ] steady non-uniform flow

8. The law of conservation of mass is governed by
   [ ] Impulse momentum equation [ ] Bernoulli Equation
   [ ] Continuity Equation [ ] Linear momentum equation

9. Boundary layer thickness if dependent only upon the Reynold's number for
[ ] Laminar flow [ ] Transition flow [ ] Turbulent flow [ ] None

10. Which of the following is the governing equations used for CFD studies?
[ ] Continuity equation [ ] Navier-Stokes Equations
[ ] Equation of motion [ ] All of the mentioned

11. Orifice Meter is gives the velocity of flow by measuring
[ ] differential area [ ] differential energy
[ ] differential pressure [ ] differential momentum

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

13. 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

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

15. 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

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

17. The pressure at a point where the fluid is brought to a complete stop is called as
[ ] stagnation pressure [ ] static pressures
[ ] dynamic pressures [ ] none of the mentioned

18. 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

19. The boundary layer thickness for the same flow conditions with high viscos fluid is
[ ] smaller than that of low viscos fluid [ ] larger than that of low viscos fluid
[ ] information on density is also needed [ ] viscosity has no effects

20. 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

KATHMANDU UNIVERSITY
End Semester Examination[C]
May/June, 2019

09 JUN 2019

Level : B. Tech.
Year : II
Time : 2 hrs. 30 mins.

Course : MEEG 218
Semester : I
F. M. : 55

SECTION "B"
[5 Q. × 11 = 55 marks]

Attempt *ALL* questions

1.

a. Differentiate types of fluids based on the viscosity. [3]
b. Derive an expression for estimating of pressure and force distribution in horizontal submerged surfaces. [3]
c. Determine the difference of pressure between the two sections of the pipe in the following figure 1, if the water at the smaller section is 1 m/s. [5]

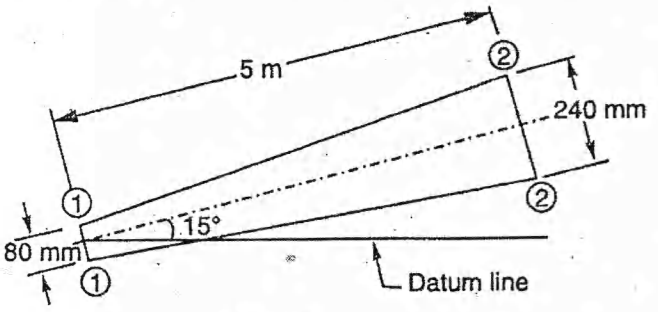

Figure 1

2.

a. Discuss the properties and applications of path lines in flow visualizations. [3]
b. Discuss role of Metacenter for the stability of a submerged body. [3]
c. What are the different methods of flow measurements commonly applied for the open channel flows? Discuss the principle of flow measurement by venturimeter. [2+3]

3.

a. Draw the formation boundary layer growth in a circular pipe. [3]
b. Discuss the different applications of flow visualization techniques. [3]
c. An inverted differential manometer having an oil of specific gravity 0.75 was connected to two different pipes carrying water under pressure as shown in the figure. Determine pressure in the pipe B in terms of kPa, if the pressure acting on pipe A is 1.5 meter of water. [5]

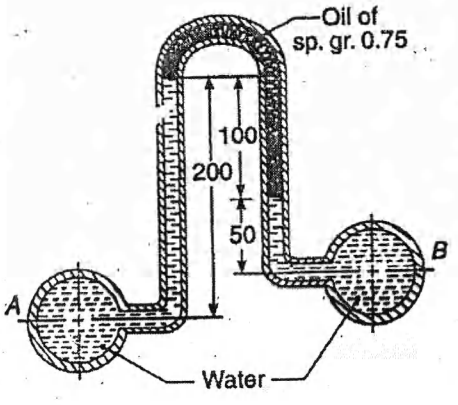

Figure 2

4.

a. A plate 2.5 mm distant from another fixed plate moves at 0.8 m/s and requires a force of 40 N/m^2 to maintain this speed. Find the viscosity of the oil between the plates. [3]
b. Discuss how angle of attack affects the velocity of a flight. [3]
c. 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]

5.

a. Derive an expression to estimate buoyant force on a submersed body. [3]
b. Differentiate between stagnation and static head. [3]
c. If the capillary rise (h) depends upon the specific weight (w) and surface tension (σ) of the fluid and the tube radius (r), show that $h = r\varphi(\frac{\sigma}{wr^2})$. [5]