

KATHMANDU UNIVERSITY
End Semester Examination [C]
November 2018

Marks Scored:

Level : B. E.

Year : II

Exam Roll No.:

Time: 30 mins.

Registration No.:

Course : CIEG 204

Semester: I

F. M. : 10

Date

NOV 16 2018

SECTION "A"

[20 Q.×0.5=10 marks]

Tick (✓) the most appropriate answer.

- The weight per unit volume of a liquid at a standard temperature and pressure is called
a. Mass density b. Specific gravity c. Specific weight d. Surface tension
- The variation in the volume of a liquid with the variation of pressure is called its
a. Surface tension b. Compressibility c. Capillarity d. Viscosity
- Gauge pressure at a point is equal to
a. The sum of absolute pressure and atmosphere pressure
b. The difference of absolute pressure and atmospheric pressure
c. The sum of vacuum pressure and absolute pressure
d. The sum of absolute, atmospheric and vacuum pressure
- Bourdon gauge measures
a. Gauge pressure b. Absolute pressure
c. Local atmospheric pressure d. Standard atmospheric pressure
- The resultant hydrostatic force acts through a point known as
a. Center of gravity b. Center of buoyancy
c. Center of pressure d. Center of mass
- For a submerged curved surface, the vertical component of the hydrostatic force is
a. Mass of the liquid supported by the curved surface
b. Weight of the liquid supported by the curved surface
c. The force on the projected area of the curved surface on vertical plane
d. Area of curved surface
- The coefficient of discharge (C_d) in terms of C_v and C_c is
a. $C_d = C_v / C_c$ b. $C_d = C_v * C_c$ c. $C_d = C_c / C_v$ d. $C_d = C_v . C_c$
- The flow in pipe is laminar if
a. Reynold's number is equal to 2500 b. Reynold's number is equal to 4000
c. Reynold's number is more than 2500 d. Reynold's number is less than 2000
- Hydrostatic law of pressure is given as
a. $\partial p / \partial z = \rho g$ b. $\partial p / \partial z = 0$ c. $\partial p / \partial z = z$ d. $\partial p / \partial z = \text{constant}$

10. Differential manometer are used for measuring
- | | |
|-----------------------------------|--|
| a. Velocity at a point in a fluid | b. Pressure at a point in a fluid |
| c. Discharge of fluid | d. Difference of pressure between two points |
11. The point about which a floating body starts oscillating when the body is tilted, is called
- | | |
|-----------------------|-----------------------|
| a. Center of pressure | b. Center of buoyancy |
| c. Center of gravity | d. Metacenter |
12. If the density of a fluid is constant from point to point in a flow region, it is called
- | | |
|------------------------|--------------------|
| a. Incompressible flow | b. Steady flow |
| c. Uniform flow | d. Rotational flow |
13. The buoyancy depends upon the
- | |
|--|
| a. Pressure with which the liquid is displaced |
| b. Weight of the liquid displaced |
| c. Viscosity of the liquid |
| d. Compressibility of the liquid |
14. The discharge over a rectangular notch is
- | | |
|--|---------------------------------------|
| a. Inversely proportional to $H^{3/2}$ | b. Directly proportional to $H^{3/2}$ |
| c. Inversely proportional to $H^{5/2}$ | d. Directly proportional to $H^{5/2}$ |
15. or maximum discharge over a triangular notch, the angle of the notch should be
- | | | | |
|---------------|---------------|---------------|----------------|
| a. 30° | b. 60° | c. 90° | d. 120° |
|---------------|---------------|---------------|----------------|
16. According to the Bernoulli's equation where the speed is high, the pressure will be
- | | | | |
|---------|--------|---------|-------------|
| a. High | b. Low | c. Zero | d. Negative |
|---------|--------|---------|-------------|
17. Ideal flow of liquid obeys
- | | |
|------------------------------|-----------------------------|
| a. Newton's law of viscosity | b. Continuity equation |
| c. Newton's law of motion | d. Dynamic law of viscosity |
18. How can we write momentum using MLT system?
- | | | | |
|-----------------------|-------------------------|-----------------------|--------------------|
| a. $[M] [L] [T]^{-2}$ | b. $[M] [L]^2 [T]^{-1}$ | c. $[M] [L] [T]^{-1}$ | d. $[M] [L] [T]^3$ |
|-----------------------|-------------------------|-----------------------|--------------------|
19. Which is the cheapest device for measuring flow/ discharge rate?
- | | | | |
|-----------------|---------------|------------------|------------------|
| a. Venturimeter | b. Pitot tube | c. Current meter | d. Orifice meter |
|-----------------|---------------|------------------|------------------|
20. Which one of the following is a major loss?
- | | |
|------------------|-----------------------|
| a. Friction loss | b. Entry loss |
| c. Exit loss | d. Sudden enlargement |

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SECTION "B"

Make suitable assumptions wherever needed. The figures in the parenthesis indicate the marks allocated for the question.

1. A plate weighing 150N and measuring 0.8m x 0.8m slides down an inclined plane over an oil film 1.2mm thickness. For an inclination of 30° and a velocity of 0.2m/s, compute viscosity of the fluid. [3]
2. A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right limb is open to the atmosphere. The center of the pipe is 100mm below the level of mercury (Specific gravity = 13.6) in the right limb. If the difference of mercury level in the two limbs is 160mm, determine the absolute pressure of the oil in the pipe. [2+1]
3. Find the resultant force due to water pressure acting on the gate shown in Figure 1 per m run. At what angle will it be acting to the horizontal? Prove that the resultant force passes through the hinge. [4+1]

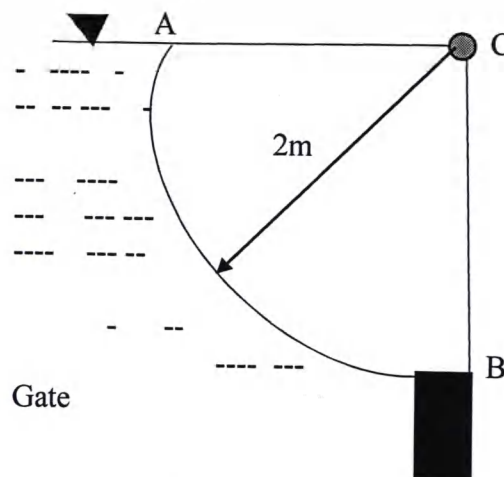


Figure 1

4. An oil of specific gravity 0.8 is flowing through a Venturimeter having inlet diameter 20 cm and throat diameter 10cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal Venturimeter. Take $C_d = 0.98$ [4]

5. Derive Euler's equation of motion along a stream line for an ideal fluid stating clearly the assumptions. Explain how this is integrated to get Bernoulli's equation along a stream line. [3+1+1]
6. What are the methods of dimensional analysis? Describe the Rayleigh's method for dimensional analysis. [1+3]
7. Explain the terms
 a. Path line b. Streak line c. Stream line [3×1=3]
8. A pipe (1) 450 mm in diameter branches into two pipes (2) and (3) of diameters 300mm and 200mm respectively as shown in Figure 2. If the average velocity in 450 mm diameter pipe is 3m/s, find (i) discharge through 450 mm diameter pipe and (ii) velocity in 200mm diameter pipe if the average velocity in 300 mm pipe is 2.5 m/s. [2+2]

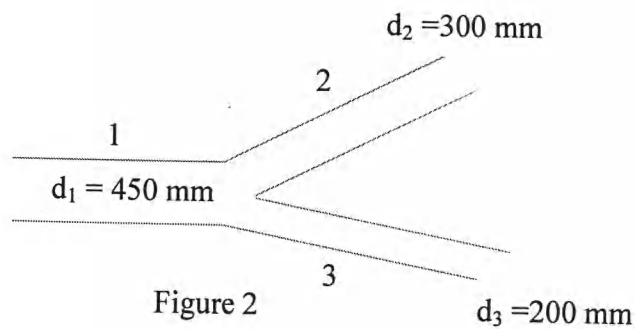


Figure 2

9. Water is flowing through a pipe having diameter 300mm and 200mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2 . Determine the difference in datum head if the rate of flow through pipe is 40 liters/sec. [3]
10. Describe briefly the experimental method of determination of the metacentric height of floating object. [3]
11. Define velocity of approach. How does the velocity of approach affect the discharge over a weir? [1+2]