Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14CE2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Mechanics of Fluids** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | | | | **Course outcome** | **Marks** |
| **PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)** | | | | | | | |
| 1. | Unit for discharge | | | | | CO1 |  |
|  | a. m3 | b. m2/s | | c. m/s3 | d. m3/s |  | (1) |
| 2. | A vessel of 4 m3 contains an oil which weighs 30 kN. The specific weight of the oil is | | | | | CO1 |  |
|  | a. 7.5 kN/m3 | b. 6.5 kN/m3 | | c. 5.5 kN/m3 | d. 4.5 kN/m3 |  | (1) |
| 3. | The ratio of specific weight of a liquid to the specific weight of pure water at a standard temperature is called | | | | | CO1 |  |
|  | a. specific gravity of liquid | | b. surface tension of liquid | c. compressibility of liquid | d. density of liquid |  | (1) |
| 4. | The viscosity of liquids …………… with decreases in temperature | | | | | CO1 |  |
|  | a. decreases | b. first increases and then decreases | | c. increases | d. first decreases and then increases |  | (1) |
| 5. | Which of the following assumptions is not considered in Bernoulli’s equation | | | | | CO1 |  |
|  | a. Fluid is ideal | b. flow is rotational | | c. flow is incompressible | D flow is steady |  | (1) |
| 6. | A grid obtained by drawing a series of equipotential lines and streamlines is called | | | | | CO1 |  |
|  | a. path line | b. stream function | | c. velocity net | d. flow net |  | (1) |
| 7. | “The intensity of pressure at any point in a liquid at rest is same in all directions” – the above statement is known as | | | | | CO1 |  |
|  | a. hydrostatic law | b. Pascal’s law | | c. Kirchhoff’s law | d. none of the above |  | (1) |
| 8. | What are the forces not considered in Reynold’s equation of motion | | | | | CO1 |  |
|  | a. Gravity force | b. Pressure force | | c. Compressibility force | d. Turbulent force |  | (1) |
| 9. | Which of the following condition represents the incompressible flow | | | | | CO1 |  |
|  | a. ρ= constant | b. . ρ~~≠~~constant | | c. both A & B | d none of the above |  | (1) |
| 10. | As the diameter of the tube increases the capillary rise | | | | | CO1 |  |
|  | 1. will not increase | b. neither increase nor decrease | | c. increase | d. decrease |  | (1) |
| 11. | A differential manometer is used to measure | | | | | CO2 |  |
|  | a. difference of pressures between two points in a pipe | b. atmospheric pressure | | c. pressure in pipes and channels | d. pressure in venturimeter |  | (1) |
| 12. | One cubic metre of water is\_\_\_\_\_\_\_ litres | | | | | CO1 |  |
|  | a. 1000 | b.100 | | c.999 | d.10 |  | (1) |
| 13. | The point at which the resultant pressure on an immersed surface acts, is known as | | | | | CO1 |  |
|  | a. centre of pressure | b. centre of gravity | | c. centre of depth | d. centre of immersed surface |  | (1) |
| 14. | …………………… possesses no definite volume and is compressible. | | | | | CO1 |  |
|  | a. solid | b. gas | | c. liquid | d. vapour |  | (1) |
| 15. | In Bernoulli’s equation the datum head is | | | | | CO1 |  |
|  | a. V2/2g | b. V1A1 | | c. V2A2 | d. Z |  | (1) |
| 16. | Venturimeter is based on | | | | | CO2 |  |
|  | a. Bernoulli’s equation | b. Newton’s law of motion | | c. Law of conservation of mass | d. Pascal’s law |  | (1) |
| 17. | A flow of 6000 litres per minute of water is equal to \_\_\_\_\_\_\_\_ m3/sec | | | | | CO2 |  |
|  | a. 0.1 | b.0.01 | | c. 0.0001 | d.1 |  | (1) |
| 18. | Local acceleration is defined as the rate of increase of \_\_\_\_\_\_\_with respect to time | | | | | CO1 |  |
|  | a. Density | b. Velocity | | c. pressure | d. Specific gravity |  | (1) |
| 19. | Energy loss due to the sudden expansion of pipe comes under | | | | | CO3 |  |
|  | a. Minor energy loss | b. Potential energy loss | | c. Kinetic energy loss | d. Pressure energy |  | (1) |
| 20. | The phenomenon of formation of vapour bubbles at low pressure area of pipe and the collapsing of these vapour bubbles at high pressure area is called | | | | | CO1 |  |
|  | a. Vapour pressure | b. Cavitation | | c. water pressure | d. all of the above |  | (1) |

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| 21. | Calculate the head lost due to friction in a pipe of 600mm in diameter and 1.5km long. The velocity of flow of water is 2.5 m/s and the friction factor is 0.02 | | | | CO3 |  |
|  | a.15.93m | b. 11.58 m | c. 13.39m | d.14.52m |  | (1) |
| 22. | If V = Volume, D = Density and M = Mass of an object, then which one of the following relationships is correct? | | | | CO1 |  |
|  | a. M = D x V | b. V= MxD | c. M = D ÷ V | d. D = M × V |  | (1) |
| 23. | Fluids which do not follow the linear relationship between shear stress and rate of deformation are termed as | | | | CO1 |  |
|  | a. Newtonian | b. Non-newtonian | c. dialent | d. ideal |  | (1) |
| 24. | Determine the size of pipe line which discharge 200 liters/min of water with a velocity of 0.4 m/s | | | | CO3 |  |
|  | a.103mm | b.203 mm | c.106mm | d.101mm |  | (1) |
| 25. | Calculate the head lost due to friction in a pipe of 600mm in diameter and 1.5km long. The velocity of flow of water is 2.5 m/s and the friction factor is 0.02 | | | | CO3 |  |
|  | a. 15.93 m | b.10.12 m | c. 20.32 m | d. 18.95m |  | (1) |
| 26. | The pressure of a liquid on a horizontal surface will always act ……….. to the surface | | | | CO1 |  |
|  | a. 450 | b. normal | c. 60o | d. parallel |  | (1) |
| 27. | Kinetic head in Bernoulli’s equation is | | | | CO1 |  |
|  | a. V/2g | b. V3/2g | c. V2/2g | d. . 2g/V |  | (1) |
| 28. | The ratio of the actual discharge and theoretical discharge is called | | | | CO1 |  |
|  | a. Co efficient of discharge | a. Co efficient of viscosity | c. Co efficient of young’s modulus | d. Co efficient of friction |  | (1) |
| 29. | Ψ denotes | | | | CO1 |  |
|  | a. stream line | b. stream function | c. velocity potential function | d. streak line |  | (1) |
| 30. | Stream function is defined only for | | | | CO1 |  |
|  | a. Three dimensional flow | b. Two dimensional flow | c. Both A &B | d. none of the above |  | (1) |
| 31. | One stoke is equal to | | | | CO1 |  |
|  | a. 104m2/s | b. 10-4m2/s | c. 10-4m3/s | d. 10-4m2 |  | (1) |
| 32. | If Reynolds number is less than 2000, then the flow will be? | | | | CO1 |  |
|  | a. Turbulent | b. Laminar | c. Transient | d. none of the above |  | (1) |
| 33. | A real fluid possesses which of the following? | | | | CO1 |  |
|  | a. surface tension | b. viscosity | c. compressibility | d. all of the above |  | (1) |
| 34. | Piezometric head of a fluid is defined as | | | | CO1 |  |
|  | a. pressure head + datum head | b. pressure head - datum head | c. Kinetic head + datum head | d. Kinetic head - datum head |  | (1) |
| 35. | Atmospheric pressure value of 101.3kN/m2 shall be also denoted as | | | | CO1 |  |
|  | a. 760 mm of mercury | b. 760 mm of water | c. 76 mm of mercury | d. 76mm of water |  | (1) |
| 36. | Which of the following is not a factor that affects viscosity? | | | | CO1 |  |
|  | a. the amount of attraction between the particles | b. the container in which the particles are held in | c. the shape and size of the particles | d. the kinetic energy of the particles |  | (1) |
| 37. | Formula to find out the rate of flow is | | | | CO1 |  |
|  | a. Velocity / Area | b. Velocity x Area | c. Velocity2x Area | d. Velocity x Area2 |  | (1) |
| 38. | Surface tension is expressed in | | | | CO1 |  |
|  | a. N/m | b. N/m2 | c. N/m3 | d. N2/m |  | (1) |
| 39. | Loss of head at the entrance of a pipe is given by | | | | CO3 |  |
|  | a. 0.5V2/2g | b. 0.5V/2g | c. V/2g | d. V2/2g |  | (1) |
| 40. | Head loss due to bend in pipe depends on | | | | CO3 |  |
|  | a. Angle of bend | b. Surface tension of the liquid | c. Viscosity of the liquid | d. Viscosity of the liquid |  | (1) |
| **PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)** | | | | | | | |
| 41. | Calculate the dynamic viscosity of oil, which is used for lubrication between a square plate of size 0.8m x 0.8m and an inclined plane with angle of inclination 300. The weight of the square plate is 300N and it slides down the inclined plane with a uniform velocity of 0.3 m/s. the thickness of oil film is 1.5mm. | | | | CO1 | (5) | |
| 43. | A simple U- tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vaccum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vaccum pressure in pipe, if the difference of mercury level in the two limbs is 40cm and the height of fluid in the left from the center of pipe is 15 cm below. Sketch the arrangements. | | | | CO2 | (5) | |
| 44. | Define Newton’s law of viscosity. Classify fluids as per Newton’s Law of viscosity. | | | | CO2 | (5) | |
| 45. | State Bernoullis equation. Explain application of Bernoullis equation for calculationof discharge in a venturimeter. | | | | CO2 | (5) | |
| 46. | Mention the types of flow. And explain any two in detail. | | | | CO3 | (5) | |
| 47. | Water is flowing through a pipe of 5cm diameter under a pressure of 29.43 N/cm2 and with mean velocity of 2 m/s. Find the total energy per unit weight of the water at a cross section, which is 5m above the datum line. | | | | CO3 | (5) | |
| 48. | The diameters of a pipe at the sections 1 and 2 are 10cm and 15cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2. | | | | CO3 | (5) | |
| 49. | The velocity potential is given by 5(x2 –y2). Calculate the velocity components at the point (4,5). | | | | CO3 | (5) | |
| 50. | An oil of spefic gravity is flowing through a pipe of diameter 300mm at the rate of 500 litres/sec. Find the head lost due to friction for a length of 1000m pipe. Take ν = 0.29 stokes. | | | | CO3 | (5) | |
| **PART C( 2 X 10 = 20 MARKS) (ANSWER ANY TWO)** | | | | | | | |
| 51. | A rectangular plane surface 2m wide and 3m deep lies in water in such a way that its plane of angle of 300 with the free surface of water. Determine the total pressure and the position of center of pressure when the upper edge is 1.5m below the free water surface. | | | | CO1 | (10) | |
| 52. | The water is flowing through a taper pipe of length 100m having diameter 600 mm at the upper end and 300 mm at the lower end, at the rate of 50 liters/second . the pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm2. | | | | CO2 | (10) | |
| 53. | Determine the difference in the elevation between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 300mm and length 400m. the rate of flow of water through the pipe is 300 litres/sec. Consider all the loses and take the value of f=.008. | | | | CO3 | (10) | |

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