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3rd Sem / Civil

Subject : Fluid Mechanics

Time : 3 Hrs. M.M. : 60

SECTION-A

Note: Multiple choice questions. All questions are compulsory (6x1=6)

Q.1 The hydrostatic law state that rate of increase of pressure in a vertical direction is equal to
- a) Weight of fluid
- b) Density of fluid
- c) Specific weight of fluid
- d) None of these

Q.2 A submerged body will be in stable equilibrium if _____
- a) The centre of buoyancy B is below the centre of gravity G
- b) The centre of buoyancy B Coincides with centre of gravity G
- c) The centre of buoyancy B is above the meta-centre M
- d) The centre of buoyancy B is above the centre of gravity G

Q.3 Pitot tube is used for measurement of_____
- a) Velocity at appoint b) Pressure
- c) Flow d) None of these

Q.4 When the pipes are connected in series, the total rate of flow_____
- a) Is the same as flowing through each pipe
- b) Is equal to the sum of the rate of flow in each pipe
- c) Is equal to the reciprocal of the sum of the rate of flow in each pipe
- d) None of the above

Q.5 The flow in open channel is turbulent if the Reynolds number is _____
- a) Less than 500 b) Less than 2000
- c) 2000 d) None of these

Q.6 Chezy's formula is given as_____
- a) V = m ÖCi b) V = iÖmc
- c) V = C Ömi d) None of these

SECTION-B

Note: Objective/ Completion type questions. All questions are compulsory. (6x1=6)

Q.7 The point where the resultant pressure acts is called_____ (Centre of pressure / vapour pressure)

Q.8 Define the term "Meta-centre".

Q.9 Continuity equation deals with the law of conservation of_____ (Energy / Mass)

Q.10 Define the term "Notch".

Q.11 _____ is the method of dimensions, in which fundamentals dimensions are M, L and T. (Dimensional analysis/ Non-dimensional analysis)

Q.12 In case of open channels, the water itself is the_____ (Hydraulic gradient / Coefficient of contraction)

SECTION-C

Note: Short answer type questions. Attempt any eight questions out of ten questions. (8x4=32)

Q.13 Describe viscosity and state the Newton's law of viscosity.

Q.14 Find the surface tension in a soap bubble of 40 mm diameter when the inside pressure is 2.5 N/m^2 above the atmospheric pressure.

Q.15 The right limb of a simple U-tube manometer containing mercury is open to atmosphere while the left limb is connected to a pipe in which a fluid of sp. gravity 0.9 is flowing. The center of pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.

Q.16 A rectangular plate 5 m long and 3 m wide is immersed vertically in water in such a way that its 5 m side is parallel to the water surface and is 1.6 m below it. Determine the total pressure on the plate.

Q.17 Describe the conditions of equilibrium for the stability of a sub-merged body.

Q.18 State the Bernoulli's theorem and write any two applications of it.

Q.19 The diameter of a pipe at the sections 1-1 and 2-2 are 400 mm and 200 mm respectively . if the velocity of water flowing through the pipe at section 1-1 is 5m/sec. Find the velocity of water at section 2-2.

Q.20 Determine the dimensions of the following quantities:

i) Discharge ii) Kinematic viscosity

iii) Force iv) Angular Velocity

Q.21 A rectangular channel 6.5 m wide is having a bed slope of1:1000. If the depth of water is 2.5m, find the mean velocity of flow and the discharge. Assuming Chezy's constant, C = 62

Q.22 Write a short note on "Centrifugal Pumps".

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x8=16)

Q.23 A main pipe divided into two parallel pipes which again forms one pipe, the length and diameter for the first parallel pipe are 2000m and 1.0m respectively, while the length and diamater of second parallel pipe are 2000m and 0.8m. Find the rate of flow in each parallel pipe, if total flow in the main pipe is 3.0m^3/s. The co-efficient of friction for each parallel pipe is same and equal to 0.049.

Q.24 a) Find the depth of alcohol of specific gravity 0.791 which produces an intensity of pressure equal to 2.10 kN/m^2. Also find the pressure head in terms of water and mercury.

b) Prove that the centre of pressure is always below its centre of gravity for an immersed plane surface.

Q.25 a) Write the properties of the most economical trapezoidal channel section along with diagram.

b) Discharge is measured by a rectangular notch of crest width equal to 0.3 m of a rectangular channel. If the depth of water above crest is 0.12m and C_d= 0.62, find the discharge.