**B. Tech. 4th Semester (Civil)**

**Examination, May–2016**

**FLUID MECHANICS-II**

**Paper–CE-204-F**

*Time allowed : 3 hours]*      *[Maximum marks : 100*

*Note :* *Students are required to attempt any **five** question and students have to attempt first common Question, which is **compulsory**, and **one** question from each four section.*

1. Explain the following :

   (a) Laminar and turbulent flow

   (b) Cavitation

   (c) Aging of pipe

   (d) Airlift pump

   (e) Surges in open channel

   (f) Priming

   (g) Components of centrifugal pump

   (h) Net positive suction head

   (i) Draft tube

   (j) Total Energy line.      2×10=20

### Section–A

2. A smooth pipe of dia 400 mm and length 800m carries water at the rate of 0.04 m³/s. Determine the head lost due to friction, wall shear stress, centre line velocity and thickness of laminar sub-layer. Take Kinematic Viscosity of water 0.18 stokes.      20

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3. (a) Explain various energy losses through pipe. 10

   (b) At a sudden enlargement of a water main from 240 mm to 480 mm dia, the hydraulic gradient rise by 10 mm. Estimate the rate of flow. 10

### Section–B

4. (a) A trapezoidal channel has side slope of 3 horizontal to 4 vertical and slope of its bed is 1 in 2000. Determine optimum dimension of the channel if discharge is $0.5 m^3/s$ and C = 80. 10

   (b) Derive the formula for maximum discharge for circular pipe i.e. d = 0.95 D. Where d = depth of water and D is Dia of pipe. 10

5. Explain :

   (a) Specific energy and specific energy curve. 8

   (b) Critical depth 4

   (c) Critical velocity 4

   (d) Brink depth analysis. 4

### Section–C

6. (a) Explain various efficiencies of a turbine. 8

   (b) A turbine is to operate under a head of 25 m at 2000 r.p.m. The discharge is 9 cumec if the efficiency is 90%. Determine performance of turbine under a head of 20m. 12

7. (a) Explain various units quantities and their uses. 12

   (b) Explain need of Draft tube, various type of Draft tube and efficiency of Draft tube. 8

### Section–D

8. (a) Explain various ports, principle of working of centrifugal pump and also explain various characteristics. 10

   (b) The dia of centrifugal pump, which is discharging $0.03 m^3/s$ of water against a total head of 20m is 0.40m. Pump is running at 1500 r.p.m. Find the head, discharge and ratio of power of geometrically similar pump of dia 0.25, when it is running at 3000 r.p.m. 10

9. (a) Describe working of Air Vessel in detail. 8

   (b) A double - acting Reciprocating pump running at 40 r.p.m. is discharging $1.0 m^3$ of water per minute. Pump has stroke of 400 mm. Dia of piston 200 mm. Delivery and suction head are 20 m and 5m respectively. Find slip of pump and power required to drive the pump. 12