A21 – 02171

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2021

FLUID MECHANICS & PNEUMATICS

[Maximum Marks: 75]   [Time: 2.15 Hours]

PART-A
(Answer *any three* questions in one or two sentences. Each question carries 2 marks)

I.   1. Define fluid.

   2. Define Reynold's number.

   3. Define fluid power.

   4. List the basic components of pneumatic systems and their functions.

   5. Define relative density.   (3 x 2 = 6)

PART-B
(Answer *any four* of the following questions.   Each question carries *6* marks)

II. 1. Define gauge pressure, vacuum pressure and absolute pressure.

   2. Find he discharge over a triangular notch of angle 60^0 when the head over the notch is 0.45m
      Assume $C_d = 0.63$.   .

   3. Explain the following properties of hydraulic fluids (i) Demulsibility (ii) Viscosity index.

   4. Explain air reservoir with neat sketch.

   5. Explain different types of fluids.

   6. List out the field of applications of fluid power.

   7. Explain double rod cylinders with neat sketch.   (4 x 6 = 24)

PART-C
(Answer *any of the three units* from the following. Each full question carries 15 marks)

UNIT – I
III. (a) A reservoir of glycerin has a mass of 1200kg and a volume of 0.952 m^3. Find the mass density,
       specific weight and specific gravity of glycerin.   (9)

   (b) What are the gauge pressure and absolute pressure at a point 3m below the free surface of a
       liquid having a density of 1530 kg/m^3 if the atmospheric pressure is equivalent to 750 mm
       of mercury? Given specific gravity of mercury is 13.6 and density of water=1000kg/m^3.   (6)

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OR

IV. (a) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in two limbs is 40cm and the height of fluid in the left from the centre of pipe is 15cm below. (8)

  (b) Determine the total pressure on an isosceles triangular plate of base 4m and altitude 4m. when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with the free surface of oil. (7)

UNIT – II

V. (a) A pipe, through which water is flowing, is having diameters, 20cm and 10cm at the cross sections 1 and 2 respectively. The velocity of water at section 1 is given 4 m/s. Find the velocity head at sections 2 and rate of discharge. (6)

  (b) Find the head lost due to friction in a pipe of diameter 300mm and length 50m through which water is flowing at a velocity of 3m/s. (i) Darcy formula (ii) Chezy's formula. Take f=0.00256 and C=60. (9)

OR

VI. (a) Calculate the discharge through a pipe of diameter 200mm when the difference of pressure head between the two ends of a pipe 500m apart is 4m of water. Take f=0.009 in Darcy's formula. (6)

  (b) A horizontal venturimeter 30cm x 15 is used to measure flow of water. A differential mercury manometer connected to the inlet and throat give a reading of 20cm. Find the discharge. Take C_d=0.98. (9)

UNIT- III

VII. (a) Explain with neat sketch hydraulic system. (9)

  (b) Explain with neat sketch the working of lobe pump. (6)

OR

VIII. (a) Explain purpose and working of hydraulic intensifier with the help of neat sketch. (9)

  (b) List out function of control valves. (6)

UNIT - IV

IX.   (a) Compare hydraulics system with pneumatic system.   (6)

     (b) Explain FRL unit.   (9)

OR

X.   (a) Explain with neat sketch the basic components of pneumatic systems and their functions.   (9)

     (b) List any six advantage of hydro pneumatics system?   (6)