SUBJECT CODE NO:- E-263
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(CIVIL) (CGPA) Examination Nov/Dec 2017
Fluid Mechanics-I
(REVISED)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.
N.B   i) Q.No.1 and Q.no.6 are compulsory.
                       ii) solve any two questions from the remaining questions in each section
Section A

Q.1   Solve any five   10
        i)   State Newton's law of viscosity and give example of its application
        ii)   Define Newtonian and Non Newtonian fluid
        iii)   What is fluid? How are fluids classified?
        iv)   One litre of oil weighs 13.2 N. Calculate its specific weight and specific gravity
        v)   Differentiate between absolute and gauge pressure
        vi)   Explain the term metacenter and metacentric height
        vii)   What are the different types of fluid flow
        viii)   What is path line and streak line
        ix)   Define forced vortex flow
        x)   Enlist different pressures

Q.2   a) Derive an expression for the force exerted on sub- merged vertical plane surface by the   07
            static liquid and locate the position of centre of pressure

        b) A U - tube differential manometer connects to pressure pipes A and B, pipe A contains   08
            carbon tetrachloride having a specific gravity 1.594 under a pressure of 11.772N/cm^2 and
            pipe B contains an oil of sp. gr. 08 under a pressure of 11.772N/cm^2. The pipe A lies 2.5 m
            above pipe B. find the difference of pressure measured by mercury as fluid filling U-tube

Q.3   a) Explain the conditions of equilibrium of a floating body and sub- merged body with neat   07
            sketch
        b) A wooden log of 0.8m diameter and 6m length is floating in river water. Find the depth of   08
            wooden log in water when the sp.gr. of the wooden log is 0.7

Q.4   a) Define stream function . obtain an expression for stream function   07
        b) The velocity potential function (Φ) is given by expression   08
            $$\Phi = -\frac{xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$$
            i)   Find the velocity components in x and y direction
            ii)   Show that Φ represents a possible case of flow

Q.5   a) Derive an expression for the metacentric height by an experimental method   05
        b) Describe the use and limitation of the flow nets   05
        c) Define surface tension and capillarity   05

2017

Section –B

Q.6   Solve any five   10
       a) What is Euler's equation of motion
       b) State the different forces present in fluid flow
       c) What is convergent divergent mouthpiece?
       d) Classify weir and notches
       e) What factor decides the type of flow in pipes?
       f) Define Hydraulic gradient line
       g) What is pitot- static tube ?
       h) What do you mean by equivalent pipe?
       i) Define momentum correction factor
       j) Give the formula for discharges over an ogee weir

Q.7   a) Derive an expression for discharge through venturimeter   07
       b) A pipeline carrying oil of specific gravity 0.8 changes in diameter from 300 mm at a   08
          position to 500mm diameter to a position B which is 5m at a higher level . If the pressure at
          A and B are 19.62 N /cm^2 and 14.19 N/cm^2 respectively and discharge is 150 litres/ s
          determine the loss of head and direction of flow

Q.8   a) Explain experimental determination of hydraulic coefficients   07
       b) The tank has two identical orifices on one of its vertical sides the upper orifice is 3 m   08
          below the water surface and lower one is 5 m below the water surface if the value of Cv for
          each orifice is 0.96 find the point of intersection of the two jets

Q.9   a) Derive an expression for discharge over a trapezoidal notch or weir   07
       b) Determine the rate of flow of water through a pipe of diameter 20cm and length 50m when   08
          one end of the pipe is connected to a tank and other end of the pipe is open to the
          atmosphere. The pipe is horizontal and the height of water in the tank is 4 m above the
          centre of pipe. Consider all minor losses and take   f= 0.009

Q.10   Write short note on
       a) Prandtl's mixing length theory   05
       b) Flow through branched pipes   05
       c) Minor energy losses   05

2017