Q.P. Code: 16CE112 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June 2019

FLUID MECHANICS & HYDRAULIC MACHINERY

(ME & AGE)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** Explain the phenomenon of capillarity. Obtain an expression for the capillary rise of a liquid. 7M

b The pressure outside the droplet of water of diameter 0.04 mm is 10.32 N/cm^2 . Calculate the pressure within the droplet if surface tension is given as 0.0725 N/m of water. 5M

OR

2 **a** Derive an expression for the force exerted on a submerged vertical plane surface by the static liquid. 5M

b A rectangular plane surface 3 m wide and 4 m deep lies in water in such a way that its plane makes an angle of 30^0 with the free surface of water. Determine the total pressure force and position of center of pressure, when the upper edge is 2 m below the free surface. 7M

UNIT-II

3 **a** Explain the terms: stream line, streak line and path line. 6M

b Explain the classification of fluid flow. 6M

OR

4 **a** Explain the terms: 'Hydraulic gradient line' and 'Energy gradient line'. 6M

b A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. Find the discharge in the pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. 6M

UNIT-III

5 **a** Derive the Darcy - Weisbach equation for the loss of head due to friction in pipes. 8M

b Explain the terms: i) Pipes in parallel and ii) Pipes in series. 4M

OR

6 **a** Explain Pitot tube and Pitot static tube. 6M

b An orificemeter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauges fitted upstream and downstream of the orificemeter give readings of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Co-efficient of discharge for the orificemeter is given as 0.6. Find the discharge of water through the pipe. 6M

UNIT-IV

7 **a** Explain the term 'dimensionally homogeneous equation' with an example. 6M

b Describe the Rayleigh's method of dimensional analysis. 6M

OR

8 **a** Explain the three types of hydraulic similarities. 8M

b Explain i) Euler's model law and ii) Weber model law. 4M

UNIT-V

9 **a** Explain the working principle of a Pelton wheel turbine with a neat sketch. 8M

b Define the various heads of a centrifugal pump. 4M

OR

10 **a** A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000 r.p.m. The vanes of curved back to an angle of 30° with the periphery. The impeller diameter is 300 mm and outlet width is 50mm. Determine the discharge of the pump if manometric efficiency is 95%. 8M

b Describe briefly about pumps in series and pumps in parallel. 4M

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