(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289918 Roll No.

B.TECH.

Regular Theory Examination (Odd Sem-III), 2016-17

FLUID FLOW & SOLID HANDLING

Time : 3 Hours *Max. Marks : 100*

SECTION - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

a) Differentiate between laminar and turbulent flow.

b) Define viscosity and kinematic viscosity.

c) What do you mean by NPSH?

d) Explain the physical significance of Reynolds number.

e) Define angle of nip.

f) What do you mean by Bingham plastic fluid?

g) Define Kick's law of crushing.

h) What is cavitation? How can it be avoided?

i) What do you mean by crushing efficiency?

j) Differentiate between Newtonian and Non-Newtonian fluids.

SECTION - B

Note : Attempt any five questions from this section. (5×10=50)

2. Classify the various types of flow meters. With the help of neat sketch explain the working principle of an orifice meter.

3. With the help of neat sketch explain the construction and working of Gyratory crusher.

4. A material is crushed in a jaw crusher and the average size of the particle reduced from 6 cm to 2 cm, with the consumption of energy 1.32×10^4 J/kg. What will be the consumption of energy to crush the same material of an average size of 5 cm to 1 cm, assuming

a) Rittinger's law and

b) Kick's law

5. Derive an expression for critical speed of ball mill. What rotational speed, in rpm, would you recommend for a ball mill of 1200 mm diameter charged with 60 mm balls?

6. A Pitot tube is placed in the centre of a pipe of 40 cm diameter. The difference between the static and impact pressure is 6cm water. The coefficient of discharge of Pitot tube is 0.98. Determine the maximum velocity and volumetric flow rate of water.

7. Derive the Bernoulli's equation from Euler's equation of motion.

8. Give the classification of pumps. With the help of neat sketch explain the working of a plunger pump in detail.

9. A sand mixture was screened through a standard 10-mesh screen. The mass fraction of the oversize material in feed, overflow and underflow were found to be 0.47 , 0.85 and 0.21 respectively. Calculate the overall screen effectiveness.

SECTION - C

Note : Attempt any two questions from this section. **(2×15=30)**

10. a) A vacuum leaf filter gives a total volume of 10 m^3 of filtrate in 30 minutes. Assuming that the resistance of filter cloth is negligible. Find the time taken for the collection of 20 m^3 and 30 m^3 of filtrate.

b) A centrifugal pump having an overall efficiency of 75% delivers 0.22 m^3/s of water to a height of 25 m though a 20 cm diameter pipe. Taking friction coefficient f = 0.004, calculate the power input to the pump.

11. a) With the help of neat sketch explain the working principle of a Rota meter and discuss how discharge can be measured?

b) The diameter of a pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s.

12. a) What are the different kinds of conveyors used in chemical industries? Discuss the working of Belt conveyor in detail.

b) Define sphericity. Calculate the sphericity of a cube of dimension 3×3×3.

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