S.E - III Sem - Biotech 12/12/2014.
SE(BioTech) - Sem III - CBSGS - UOP 12 DEC 2014
Unit Operations - I

QP Code :14693

(3 Hours) **[Total Marks :80**

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Note:

1. Question No. 1 compulsory.
2. Attempt any three questions out of remaining five questions.
3. Assume suitable data wherever necessary.

Q.1 Attempt any four questions. (20)

a. What is viscosity of fluid? State Newton's law of viscosity.

b. Write down the general form of Bernoulli's equation. Explain the significance of each term.

c. Explain the necessity of size reduction. State the factors affecting size reduction.

d. What are the different types of impeller used for mixing?

e. What is cavitation and priming in a centrifugal pump?

f. Differentiate between laminar and turbulent flow.

Q.2 a. Develop an expression for local velocity, maximum velocity and average velocity for flow of Newtonian fluid in laminar flow through circular pipe. (10)

b. A crude oil of viscosity 0.9 poise and specific gravity 0.8 is flowing through a horizontal circular pipe of diameter 80 mm and length 15m. Calculate the difference of pressure at two ends of the pipe, if 50kg of oil is collected in tank in 15 sec. (10)

Q.3 a. Calculate the operating speed of the ball mill for the following cases from the given data: (06)

Diameter of ball mill = 300mm and diameter of ball = 60mm

If i) operating speed is 55% less than critical speed

ii) critical speed is 40% more than operating speed.

b. A simple U- tube manometer containing mercury is connected to a pipe in which fluid of specific gravity 0.8 and having vacuum pressure is flowing through the other end is open to atmosphere. Find the vacuum pressure in pipe, if difference of mercury level in the two limbs is 40cm and height of fluid left from centre of pipe is 15cm below. Specific gravity of mercury is 13.6 (06)

c. Explain constant rate and constant pressure filtration. (08)

Q.4 a. Water is flowing through a pipe having diameters 20cm and 10cm at sections 1 and 2 respectively. The rate of flow through pipe is 35lit/s. The section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24N/cm^2, find the intensity of pressure at section 2. (Density of water = 1000kg/m^2) (10)

b. State and explain different conveyor systems for transportation of solids. (10)

Q.5 a. Explain the effects of temperature and pressure on viscosity of fluids. (05)

b. What are the factors that influence the size of the product in ball mill? (05)

c. Classify flow measuring devices and explain in detail about rotameter. (10)

Q.6 Write a note on (any four) (20)

a. Centrifugal pump

b. Hindered settling

c. Screen effectiveness

d. Boundary layer formation

e. Euler's equation of motion
