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GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:3150505 **Date:01/02/2021**

Subject Name:Particle and Fluid Particle Processing

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Differentiate between cake filtration and clarifying filtration . **03**

(b) Define separation factor for cyclone. List out factors affecting the performance of the cyclone. **04**

(c) A sludge forming a uniform non compressible cake is filtered through a filter press out of which one frame is kept under study. At a certain pressure difference of 2.8 kg/cm^2, a 10 cm cake is formed in one hour with a filtrate volume of 6000 litres. 3 minutes are needed to drain the liquor from filter. 2 minutes are needed to fill the filter with water. Washing proceeds exactly as filtration using 1200 litres. Opening, dumping and closing take 6 minutes. Assume the filtrate has the same properties of wash water and neglect resistance offered by the cloth and flow lines. How many litres of filtrate are produced in 24 hours on the average? **07**

Q.2 **(a)** A tank 1.2 m in diameter and 2 m high is filled to a depth of 1.2 m with a latex having a viscosity of 10 P and density of 800kg/m3. The tank is not baffled. A three blade 360-mm diameter propeller is installed in the tank 360 mm from the bottom. The pitch is 1:1.To drive the agitator at 800 rpm what should be the capacity of motor? From graph Np=0.73 **03**

(b) Write short note on conditions for fluidization with neat sketch. **04**

(c) Explain construction and working of Bollman extractor for leaching operation. **07**

Q.3 **(a)** List out application of fluidization. **03**

(b) With neat sketch explain working of Tray drier for solids. **04**

(c) Discuss Kynch theory for design of continuous thickener. **07**

Q.4 **(a)** Define: (i) critical moisture content (ii) magma (iii) and mesh number. **03**

(b) Discuss mechanism of slurry transport. **04**

(c) Explain types of fluidization. **07**

Q.5 **(a)** State the various purpose of agitation of liquids. **03**

(b) Calculate the sphericity of a cylinder of diameter 1 cm and height 3 cm. **04**

(c) Discuss factors to be consider in scale up and selection of agitated vessels **07**

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Q.6	**(a)**	Differentiate between compressible cake and incompressible cake.	**03**
	(b)	Discuss sink and float method of sorting classifiers.	**04**
	(c)	Discuss various method for generation of supersaturation in crystallization.	**07**
Q.7	**(a)**	Write brief note on homogeneous nucleation.	**03**
	(b)	Explain mechanism of drying through Porous solids.	**04**
	(c)	Write short note on static mixers.	**07**
Q.8	**(a)**	Give significance of Power no, Reynolds no and Froude no for mixing of liquids.	**03**
	(b)	Air is moving upward in a bed of spherical coal particles of diameter 0.1 mm and density 1000 kg/m3. The air properties are density = 2.4 kg/m3 and viscosity = 1.9 x 10^{-5} Pa.s. Find the minimum fluidization velocity and terminal settling velocity of the particle. The void fraction of the bed is 0.38.	**04**
	(c)	Explain construction and working of fluidized bed reactor.	**07**

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