Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2021

Subject Code:3150505 Date:27/12/2021

Subject Name:Particle and Fluid Particle Processing

Time:02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Write a brief note on batch sedimentation.	**03**
	(b)	Write a brief note on conditions for fluidization with neat sketch	**04**
	(c)	Explain construction and working of Bollman extractor for leaching operation.	**07**
Q.2	**(a)**	Differentiate between cake filtration and clarifying filtration	**03**
	(b)	Differentiate between compressible cake and incompressible cake.	**04**
	(c)	Explain working of Tray drier for solids with a neat labeled sketch	**07**
		OR	
	(c)	An agitated baffle vessel is being used to prepare a uniform solution of viscosity 2 cP, running the agitator at 40 rpm, so as to obtain a Reynolds number of 25,000. If the contents of the vessel are replaced by a solution of viscosity 5 cP, and the agitator rpm is increased to 100, by how much will the power requirement change?	**07**
Q.3	**(a)**	List out different application of fluidization	**03**
	(b)	Write a brief note on mechanism of slurry transport.	**04**
	(c)	Discuss Kynch theory for design of continuous thickener.	**07**
		OR	
Q.3	**(a)**	Define: (i) critical moisture content (ii) magma (iii) mesh number.	**03**
	(b)	Outline the various purpose of agitation of liquids in chemical engineering.	**04**
	(c)	Explain construction and working Swenson walker crystallizer with a neat sketch.	**07**
Q.4	**(a)**	Outline the significance of Power number, Reynolds number and Froude number for mixing of liquids.	**03**
	(b)	Define separation factor for cyclone. List out factors affecting the performance of the cyclone.	**04**
	(c)	Discuss factors to be considered in scale up and selection of agitated vessels.	**07**
		OR	

Q.4	**(a)**	How homogeneous nucleation takes place?	**03**
	(b)	Write a brief note on sink and float method of sorting classifiers.	**04**
	(c)	Explain construction and working of fluidized bed reactor.	**07**
Q.5	**(a)**	Differentiate between solid and liquid mixing.	**03**
	(b)	Draw neat sketches of different types of impellers for agitation of liquids.	**04**
	(c)	Write a brief note on static mixers and its application in chemical engineering	**07**

OR

Q.5	**(a)**	What is swirling and how can it be prevented?	**03**
	(b)	Explain mechanism of drying occurring through porous solids.	**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 6500 litres. 5 minutes are needed to drain the liquor from filter. 4 minutes are needed to fill the filter with water. Washing proceeds exactly as filtration using 1500 litres. Opening, dumping and closing take 10 minutes. Assume the filtrate has the same properties of wash water and neglect resistance offered by the cloth and flow lines. How many liters of filtrate are produced in 1 day on the average?	**07**

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