CLASS: BTECH   SEMESTER : IV
BRANCH: CHEMICAL   SESSION : SP2023

SUBJECT: CL205 R1 MECHANICAL OPERATIONS
TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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			CO	BL
Q.1(a)	Differentiate between Cumulative and differential analysis	[2]	1	1 Remember
Q.1(b)	Define sphericity. Calculate sphericity of a short cube assume L=D	[3]	2	3 Apply
Q.2(a)	Explain the meaning and significance of the following in particle technology. a. Arithmetic mean diameter b. Mass mean diameter	[2]	1	2 Understand
Q.2(b)	How do you determine Pressure at the base of a vertical bin filled with particulate solids by Janssen Equation	[3]	3	4 Analyze
Q.3(a)	Classify different conveying system and mention the criterion required for selecting it.	[2]	4	2 Understand
Q.3(b)	Illustrate Gyratory crushers, smooth roll and toothed-roll crushers with neat figures and explain disadvantages of roll crushers in respect of leakage and abrasion. Also, mention the dominant forces in crushers and fluid energy mills.	[3]	2	2 Understand
Q.4(a)	For a size reduction process, power required to reduce feed of 51mm to product of 3.2mm, is 167.5kW. Let feed rate be 99 tons/hr. Solve for (i) wet grinding W_i and (ii) dry grinding W_i	[2]	1	3 Applying
Q.4(b)	Outline disadvantages of (i) hammer mills & (ii) rod mills with reference to rods. Write the expressions for forces inside ball mill and outline phenomena occurring in ball mills a) if rpm >> critical speed and b) rpm << critical speed	[3]	4	2 Understand
Q.5(a)	Distinguish (i) W & W_n (ii) η_m & η_c	[2]	4	4 Analyzing
Q.5(b)	In a grinding mill, initial feed material of 4/6 mesh is used. Grinding rate function is 0.001 S^{-1} and ß = 1.5. If mass fraction of starting material is 0.0251, (i) estimate time required for the mass fraction to reduce by 20% (ii) If dia of initial feed is 3.327mm and dia of particles in immediate next level is 2.362mm, evaluate $B_{2,1}$ and $\Delta B_{2,1}$	[3]	3	5 Evaluating

::::::20/02/2023::::::M