

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***BE/B.Tech DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026****Fourth Semester***Department of Chemical Engineering***PC3352 / UCHT24402 - MECHANICAL OPERATIONS****Regulations – 2021/2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	Define sphericity for a non-spherical particle.	L1	1	2
2.	What is blinding of screens?	L1	1	2
3.	State Bond's law of crushing.	L1	2	2
4.	Compare closed and open circuit grinding.	L4	2	2
5.	Define free settling.	L4	3	2
6.	Distinguish between classifier and clarifier.	L2	3	2
7.	What are filter aids? Give examples.	L2	4	2
8.	What are the good qualities of a filter media?	L2	4	2
9.	Define mixing index.	L1	5	2
10.	Differentiate between agitation and mixing.	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a i	Classify screening equipment with the help of neat sketches.	L4	1	16
	Or			
b i	Analyze the operational principles of a vibrating screen and explain how vibration parameters influence screening efficiency.	L4	1	16
12. a i	Estimate the terminal velocity for 80-100 mesh particles of limestone ($\rho_p = 2800 \text{ kg / m}^3$) falling in water at 30°C Data: DP for 100 mesh = 0.147 mm, DP for 80 mesh = 0.175 mm, viscosity of water = 0.801 cP, Density of water = 995.7 kg/m ³ , CD = 7.9.	L4	2	8
ii	A material is crushed in a jaw crusher and the average size of the particle is reduced from 5 cm to 1.3 cm with consumption of energy at the rate of 37 Watt.hr/ton. What will be the consumption of energy necessary to crush the same material of average size 8 cm to an average size 3cm. The mechanical efficiency remains same. (a) Using Rittinger's law (b) using Kick's law.	L4	2	8
	Or			
b i	Analyze the operation of a double roll crusher with the help of a diagram. Derive the expression for angle of nip and evaluate how variations in roll diameter, feed size, and speed affect the crushing process.	L4	2	16
13. a i	Analyze the principle of centrifugal sedimentation and examine the working of a top suspended batch centrifuge with a neat sketch.	L3	3	16

Or

b	i	Explain with neat sketch, working principle of cyclone separator.	L3	3	10	
	ii	Discuss the electrostatic separation methods.	L3	3	6	
14.	a	i	Discuss about the working of a rotary drum filter with a neat sketch.	L3	4	16
Or						
b	i	Develop an expression between thickness of cake and volume of filtrate for filtration at constant pressure.	L3	4	10	
	ii	Organize out the factors affecting the rate of filtration.	L3	4	6	
15.	a	i	Develop an expression for calculating power consumption in agitating Newtonian fluid by using dimensional analysis	L5	5	16
Or						
b	i	What are the types of mixtures suitable for pastes and plastic masses? Discuss any one of them with a neat sketch.	L5	5	16	
