QPC: RJ19BTECH153 AR 19 Reg. No | | | | | | | | | | |

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester – Regular) Examinations, June – 2021

BPCCH4040 / BPCPR4040 – MECHANICAL OPERATIONS

(Common to Chemical Engineering and PRE)

Time: 2 hrs Maximum: 50 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer *ALL* questions	[CO#]	[PO#]
a. Pressure drop can be dimensionally written as ___	1	1
(i) $[D/\Theta^{-1}]$ (ii) $[F/L^2]$		
(iii) $[M\Theta^{-1}]$ (iv)$ML\Theta^{-1}$		
b. What is the average particle size of ultra-fine grinders?	1	1
(i) 1 to 20 µm (ii) 1 to 200 µm		
(iii) 1 to 2000 µm (iv) 1 to 689 µm		
c. Which of the following uses impact and attrition?	1	1
(i)ultra-fine grinder (ii) Ball Mill		
(iii)Tumbling mill (iv) None of the above		
d. According to Rittingers law, work required is proportional to _____	2	1
(i) Surface area created (ii) final Volume		
(iii) final density (iv) All the above		
e. The most accurate law for estimating the power is ____	2	1
(i) Rittingers law (ii) Bonds law		
(iii) Kicks law (iv)Power law		
f. Particles will be compacted, if initial pressure is ____	2	1
(i) High (ii) low		
(iii) Constant (iv)Very high		
g. _____ consists of introducing water through the strainers.	3	1
(i) Front washing (ii) back washing		
(iii) Rapid (iv) None of the above		
h. When cake is difficult to separate then, a _____ is employed.	4	1
(i)High pressure (ii) String discharge		
(iii) stone force (iv) None of the above		
i. Filter aids are added to the slurry prior to filtration in order to form _____	4	1
(i) Compact cakes of low porosity (ii) Cakes of increased porosity		
(iii) Crystalline cakes (iv)Baked cake		
j. In a filter bed, the liquid flow _____	4	1
(i)laminar (ii) turbulent		
(iii)transient (iv) both a and b		

PART – B: (Short Answer Questions) **(2 x 5 = 10 Marks)**

Q.2. Answer ***ALL*** questions		[CO#]	[PO#]
a.	Differentiate screening and sieving.	1	1
b.	Give the ratio of the area of the opening in any one screen based on Taylor standard screen series.	2	1
c.	Define froth flotations	3	1
d.	Design variables for any agitation process with examples.	3	2
e.	Write the factors that influence "Rate of Mixing"	4	1

PART – C: (Long Answer Questions) **(6 x 5 = 30 Marks)**

Answer ***ANY FIVE*** questions		Marks	[CO#]	[PO#]
3.	Discuss in detail for the determination of Nature of the material to be crushed.	(6)	1	1
4.	Discuss with neat sketch and explain the working of the ball mill.	(6)	1	1
5.	Derive the expression for screen effective ness.	(6)	2	2
6.	Discuss briefly about the Electrostatic Separators.	(6)	2	1
7.	With neat sketch detailly elaborate the cyclone separator.	(6)	3	1
8.	Calculate the terminal settling velocity for quartz spheres in water at 20ºC as a function of particle diameter for the range from 0.01 to 10mm. The density of quartz is 2.65 g/cc. Viscosity of water is 0.01 poise.	(6)	3	2
9.	Discuss briefly about the Flocculation Filter Aids and filter Media and Kneaders and Masticators	(6)	4	1
10.	A slurry is being filtered at constant pressure in a plate and frame filter using 10 frames, having a total filtration area of 10 m2. The filter delivers 250 litres filtrate in 30 minutes. To increase the filtration capacity 10 more frames are added to the filter. All other conditions being the same as before how long will it take to collect 500 litres filtrate? Initial filter resistance is found to be negligible.	(6)	4	2

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