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S.E. (Chemical) (Part-I) (Semester-III) (Revised) Examination, May - 2017 MECHANICAL OPERATIONS Sub. Code : 63425

Day and Date : Thursday, 18-05-2017 Time : 2.00 p.m. to 5.00 p.m.

Total Marks : 100

Instructions :

Seat No.

Answer any three questions from each section.
 Assume suitable data, if necessary.

SECTION-I

Q1) a) Define.

[8]

i) Average size ii) Volume surface mean diameter

iii) Mass mean diameter iv) Specific surface Area

b) Calculate the surface volume mean diameter (D_p) for the following particulate material.

Avg. Particle dia (\overline{D}_{P_i})	528	264	132	66	44	
Mass of particle retained	25	37.5	62.5	75	50	[10]

Q2) a) Derive an expression for critical speed of ball Mill. [8]

- b) Explain the difference between Jaw crusher and Gyratory Crusher. [8]
- Q3) a) Explain the vibrating screen with neat sketch and include its, construction, working and applications. [8]
 - b) A crushing roll 1 m in diameter are set so that the crushing surfaces are 12.5 mm apart and the angle of nip is 31°, what is maximum permissible size of particle which should be fed to the rolls? [8]

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31.597	SL-597
Q4) a) Explain the flow pattern in an unbaffled, baffled vessel as propeller with neat sketch.	nd off center [8]
b) Derive an expression for mixing index for pastes and visco SECTION-II	ous masses. [8]
Q5) a) State the three main groups of filters and explain the me filtration with a neat sketch.	abott book [8]
b) Explain the mechanism of deep bed filtration with diagram.	
Q6) a) Explain the continuous thickner with neat sketch.	[10]
b) Explain the Kynch theory of sedimentation.	[8] a) []
Average size i) Volume surface mean diameter	0
Q7) a) What are types of magnetic separators? Explain any one.	(iii [8]
 b) Explain the principles of Forth flotation, Magnetic separation Gravity settling tank, Jigging & Scrubbe (Q) and separation Gravity settling tank, Jigging & Scrubbe (Q) and separation (Q)	er. [8]
b) Explain the liquid washing & also draw a neat sketch of spi	6141
rive an expression fo Antic Aspec of ball Mill. [8]	· · ·
plain the difference between Jaw crusher and Gyratory Crusher. [3]	
International designation and the second sec	(raid) (CM) (C
plain the vibrating screen with neat sketch and include its, construction tking and applications.	
rushing cold 1 in in connects are set so that the crossing surfaces are from aport and the angle of nip is 91° what is on monopentitalities of particle which should be test to the collis. We will be test to the collis.	N. N

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SF - 349 Total No. of Pages :3

S.E. (Chem.) (Part - II) (Semester - III) (Revised) Examination, November - 2017 MECHANICAL OPERATIONS Sub. Code: 63425

Day and Date : Thursday, 23 - 11 - 2017 Time : 10.00 a.m. to 1.00 p.m.

1)

2)

Total Marks : 100

[8]

Instructions :

Seat No.

- Answer any three questions from each section.
- Assume suitable data if necessary.

SECTION - I

Q1) a) State the ways to measure the size and shape of irregular particles. [8]

b) State & explain the properties of solid masses.

Q2) a) Give the classification of size reduction equipment. Explain fluid energy mill with neat sketch. [8]

b) A material is crushed in a jaw crusher such that the avg. size of particle is reduced from 50mm to 10mm with consumption of energy of

 $13.0\left(\frac{Kw}{kg/s}\right)$. What should be the consumption of energy needed to

crush the same material of a avg. size 75mm to an avg. size of 25 mm. Assume

i) Rittinger's law.

ii) Kick's law applicable.

Which of these results would be regarded as being more reliable ? why? [10]

P.T.O.

SF - 349

[8]

[10]

Q3)a) 1 ton/h of dolomite is produced by a mill operating in closed circuit with 100 mesh screen. The screen analysis (weight.%) is given below. Calculate the screen efficiency.

Mesh	35	48	65	100	150	200	-200	
Feed	7.07	16.60	14.02	11.82	9.07	7.62	33.80	
Oversize	13.67	32.09	27.12	20.70	4.35	2.07	0	
Undersize	0	0	0	2.32	14.32	13.34	70.02	

b) Give the list of Industrial screening equipment and explain any one in detail.
 [8]

Q4) a) Explain the mixing mechanism and state the difference between mixing and blending.[8]

 b) Explain Ribbon blender with reference to its working, sketch, construction and applications.
 [8]

SECTION - II

Q5) a) Explain the washing mechanism of cake with sketch.

b) What are the different materials for filter mediums? Also write down the properties required by a filter medium. [8]

Q6) a) Define sedimentation & explain basic principles of sedimentation. [8]

b) Explain the batch sedimentation test with diagram.

-2-

[8]

Q7) a) Give the list of promoters, collectors, modifiers & frothing agents. [8]

b) Explain the Jigging.

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Q8) a) Explain the principle & types of impingement separators with neat sketch. [8]

b) Describe the Cyclone separators & its industrial applications. [8]

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Total No. of Pages : 3

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LIBRARY fatyasaheb Kore Institute of Engineering & Technology Warananagar S.E.(Chem.)-I (Revised)

Examination, December - 2015

MECH.OPERATIONS

Sub. Code : 63425

Day and Date : Monday, 14-12-2015 Time : 10.00 a.m. to 01.00 p.m.

Total Marks: 100

Instructions :1)Answer any three questions from each section.2)Assume suitable data if necessary .

SECTION-I

Q1) a)		[8]
[8] b)	A sample of pyrite was screened. The screen analysis is given belo	W.
(prussard) [8]	Bitation	Q5)
uspended	ii) Specific surface.	
	Data:- sp. gr. of pyrite is 5.0.	[8]
Q2) a)	Derive an expression for crushing efficiency((ηc) .	(8) [8]
b) 51-10015 19]	Calculate the operating speed of the ball mill Dia of ball mill=800 Dia of ball=60 mm operating speed of mill is 55% less than crisspeed.	
Q3) a)	Explain with neat sketch.	[8]
	i) Trommel	
	ii) Vibrating screen	

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S-2182

 b) A quartz mixture having the screen analysis as shown in table and is screened through a standard 14 mesh screen. Calculate the mass ratio of overflow and underflow and efficiency. [10]

Table:- Screen analysis.

Mesh No		4	6	8	10	14	20. 28	35	65
Dp,mm		4.7	3.3	2.36	1.65	1.17	0.8 0.4	5 0.4	0.21
Cumulative	Feed	0	0.02	0.15	0.47	0.73	0.88 0.9	0.96	0.98
wt.fraction	\rightarrow					195,44	16.1	和.严	ar ^a
	Overflow	0	0.071	0.43	0.85	0.97	0.99 1.0)	+-
	\rightarrow			10 1	ant est	1807			
	\rightarrow							5	
	Under flow	-		0	0.195	0.58	0.830.9	1 0.9	

Q4) a)	State the advantages of wet grinding.	[8]
b)	Explain the pug mill with diagram.	[8]

SECTION-II

- Q5) a) Define filtration and explain constant rate filtration and constant pressure filtration.
 - b) State the principle of centrifugal filtration and explain the suspended batch centrifugal. [9]
- Q6) a) Write in detail on a Dorr Thickner with a sketch and industrial application.[8]
 - b) Data for the filteration of CaCO₃ slurry in water at 25°C are reported as follows at constant pressure of 46.2 kN/m². The area of filtration was $0.0439m^2$ and slurry concentration was 23.47 kg solid/m³ filterate Calculate the constant α and R_m. [9]

Data:-

V×10 ³	0.5	1.0	1.5	2.0	2.5	3.0
θ	17.3	41.3	72.0	108.0	152.0	201.7

 $[\]mu = 8.86 \times 10^{-4} \text{ kg/m.s}$

	S-	2182
Q7) a)	Explain the hydrocyclone with neat sketch.	[8]
b)	Write in detail on a scrubber with diagram & state its adva disadvantage & industrial application.	antage, [8]
Q8) a)	What do you mean by benefication process? Explain any one	[8]
b)	Explain the Electrostatic precipitators.	[8]

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		Sub	ICAL OPERATIONS Code : 42725		n _e na int
Day and l	Date : Friday, 0	7 - 06 - 2013	leading sizes of a production		rks : 100
0.001	30 p.m. to 5.30 p		to area of product.		3
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Instructio			estions from each section on on separate page	dauh/	
		e suitable dat		04	
		0.128	0.2844	8.0	
		0.3207	SECTION - I	8/10	
<i>Q1</i>) a)	What are th	e various fa	ctors involved in char	acterisation of	solid
- · ·	particles ?	0.1590	1001.0	14/30	[8]
b)	Calculate :	0.0538	0.0711	20/28-	
			ylindrical particle of ha		
<i>Q2)</i> a)	diameter ii) the sph Differentiate	er of value 30 ericity of cu the terms mi	be of size = 3 cm . 172.0 = 80 172.0 = 100	a : Density of s:	Dat [9] Ty liquids
Q2) a)	diameterii) the sph	er of value 30 ericity of cu the terms mi	$\begin{array}{l} \text{mple} = 2.65 \text{g/gc}, \text{m}^{\text{m}}\\ \phi_{3} = 0.571\\ \phi_{3} = 3 \text{cm}.\\ \text{section}\\ 1 - 10 \text{N} - 1 \end{array}$	a : Donsity of a g of low viscosit	Dat [9]
	diameter ii) the sph Differentiater with example	er of value 30 ericity of cu the terms mi e.	cm. $223320.2 = 91qm$ be of size = 3cm. 1 - 1011012 xing of solids and mixin	a : Density of s tizosziv wol to g Explain the fil	[9] ty liquids (6) (8)
[8]	diameter ii) the sph Differentiater with example	er of value 30 ericity of cu the terms mi e. mixing mech	$cm. \qquad give = 2.65g/gcc. = elqmibe of size = 3 cm.be of size = 3 cm.1 - \frac{100112}{100112}xing of solids and mixintot mainedoom noiterouanism involved in mixin$	a : Density of s tizosziv wol to g Explain the fil	[9] ty liquids (15 [8] ber and
[8]	diameter ii) the sph Differentiater with example Explain the r	er of value 30 ericity of cu the terms mi e. mixing mech c masses	$cm. \qquad give = 2.65g/gcc. = elqmibe of size = 3 cm.be of size = 3 cm.1 - \frac{100112}{100112}xing of solids and mixintot mainedoom noiterouanism involved in mixin$	a : Density of s g of low viscosit dit off national ng of pastes,rubl anitying (ii	[9] ty liquids (15 [8] ber and
(8) b) <i>Q3)</i> a)	diameter ii) the sph Differentiate with example Explain the r heavy plastic	er of value 30 ericity of cu the terms mi e. mixing mech c masses	cm. 2.05g.gcc	g of low viscosit dit orb niniqxe ng of pastes,rubl anivitatio (ii ord acoro (iii ch example, A	[9] ty liquids (n [8] ber and [8]
(8) b) <i>Q3)</i> a)	diameter ii) the sph Differentiate with example Explain the r heavy plastic	er of value 30 ericity of cu the terms mi e. mixing mech c masses	cm. 2.05g.gcc	g of low viscosit dit orb niniqxe ng of pastes,rubl anivitatio (ii ord acoro (iii ch example, A	[9] ty liquids (r. [8] ber and [8]
[8] b)	diameter ii) the sph Differentiate with example Explain the r heavy plastic	er of value 30 ericity of cu the terms mi e. mixing mech c masses e different wa size reduction	mple = 2.65g/gccm 63= 0.571 03= 0.571 03= 0.571 04 05 05 05 05 05 05 05 05 05 05	a i Density of a g of low viscosit dit off nastes,rubl anivitato (ii anivitato (ii anivitato (ii h example, A odwooz (081	[9] ty liquids (r. [8] ber and [8]
(8) b) <i>Q3)</i> a)	diameter ii) the sph Differentiater with example Explain the r heavy plastic Illustrate the Explain the s	er of value 30 ericity of cu the terms mi e. mixing mech c masses e different wa size reduction 1	cm. 2013 co.2 = olquu be of size = 3 cm. NOITO 12 xing of solids and mixin anism involved in mixin not main down noitheon anism involved in mixin not size reduction with n mechanism in i) ball mil	a i Density of a g of low viscosit dif off pastes, rubl anivitado (ii anivitado (ii) anivitado	[9] ty liquids (r. [8] ber and [8] (d [9] [8]
b)	diamete ii) the sph Differentiate with example Explain the r heavy plastic Illustrate the Explain the s i) rod mil ii) tube mi	er of value 30 ericity of cu the terms mi e. mixing mech c masses e different wa size reduction 1 11	cm. 2013 co.2 = olquin be of size = 3 cm. NOITO 12 xing of solids and mixin tol main door noite of anism involved in mixin total a toon drive rolling hys of size reduction with n mechanism in	g of low viscosit dif off niniqx3 ng of pastes,rubl anivitatio (ii off azoro (ii ch example, 1 h	[9] ty liquids (n [8] ber and [8]

.

158 -K - 321 Explain the motions of screens with neat diagram [8] 04) a) The screen analysis for a sample of crushed quartz is shown in table 1. b) HECHANICAL OPPLICATIONS Estimate Sub.Code : 42725 Average particle sizes of a product (Ds,Dw & Dv i) ii) Sp.surface area of product. [8] Table 1 screen analysis for quartz sample Avg particle dia Mesh Mass fraction 4/6 0.4013 0.0251 6/8 0.2844 0.125 0.206 8/10 0.3207 10/14 0.1409 0.257 14/200.1590 0.1001 20/280.0711 0.0538 28/35 not any ort (0.0503 or to interference 0.021) review on Data : Density of sample = 2.65g/cc $\phi 3 = 0.571$ SECTION - II Explain the filteration mechanism for [8] 05) a) cake filter xim in be down manadom grixin od inistry hai roddi) clarifying filter REAL PRESSIC MARKERS ii) cross how filter with neat sketches iii) A plate and frame press, filtering a slurry gave a total of 8 m³ of filterate in b) 1800 sec, when filteration stopped. Estimate the washing time if 3 m³ of wash water used .constant pressure is used. [9] Q6) a) Explain the principle of clarifying filter [8] What is the difference between cyclone separator and hydrocyclone ? b) Explain the construction and working of hydrocyclone. [8]

- Q7) a) Discuss the basic principles involved in the benification of ores by froth flotation. with suitable examples Explain the roll of collectors frothing agents and modifiers in the operation.
 - b) What is the principle of wet scrubbing ? State the types of scrubbers [8]
- Q8) a) Explain the principle of bag filter and also Explain the unstruction and working of bag filter with a neat diagram.[8]
 - b) What is the principle of electrostastic precipitators ? and draw the diagram for. [8]
 - i) cylinder type precipitator
 - ii) Plate type precipitors

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N - 472

S.E. (Chemical) (Semester – III) Examination, 2011 MECHANICAL OPERATIONS

Day and Date: Saturday, 14-5-2011 Time: 2.30 p.m. to 5.30 p.m. Max. Marks: 100

Instructions: 1) Answer any three questions from each Section. 2) Assume suitable data if necessary.

SECTION - I

1. a) Derive an expression for the total surface area of given fraction. 8 7. J) Give the list of gas cleaning equipment and explain the momentum; ninfqx3 (d i) Angle of repose ii) Angle of friction. 8 2. a) Derive an expression for the critical speed of a ball mill. 8 b) A certain set of crushing roll has rolls of 100 cm diameter by 38 cm width face. They are set so that the crushing surfaces are 1.25 mm apart at the narrowest point. The angle of nip is 30°. What are the maximum permissible size of feed ? 9 3. a) Explain the screening motions with neat sketch. 8 b) Explain the trammel with neat sketch and also mention its industrial applications. 8 4. a) Explain the : i) Turbine ii) Paddles iii) Propeller with neat sketches. b) Derive an expression for mixing index and its effectiveness. P.T.O. N - 472

Engineering and Technolog Warananagar, Dist. Kolhagu, BII – NOITTJES

5.	a)	Discuss the types of industrial filtration and explain the rotary drum filter with neat sketch.	9
	b)	Explain :	
		i) Filter aids	
		ii) Filter medium selection	8
6.	a)	Explain the sedimentation process with neat sketch.	8
	b)	Explain : i) Flocculation	
		ii) Agglomeration.	8
7.	a)	Give the list of gas cleaning equipment and explain the momentum separator.	9
	b)	What do you mean by impingement methods ? Explain any one equipment based on impingement method.	8
8.	a)	Compare the hydraulic jig with froth flotation cell.	8
	b)	Hydrophilic and hydrophobic materials.	8
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