

# **MINERAL PROCESSING (MCQ QUESTIONS)**

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**Lect. In Metallurgy**

**DIPLOMA**

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# Question Bank

## Mineral Processing

### (3<sup>rd</sup> Semester)

1. Shape factor for a cylinder whose length equals its diameter is  
 (a) **1.5** (b) **0.5**  
 (c) 1 (d) 0
2. The ratio of the actual mesh dimension of Taylor series to that of the next smaller screen is  
 (a) 2 (b) 2  
 (c) 1.5 (d) 1/ 2
3. The opening of 200 mesh screen (Taylor series) is  
 (a) 0.0074 cm (74 micron)  
 (b) 0.0074 mm  
 (c) 0.0047 cm  
 (d) 0.074 cm
4. The ratio of the area of openings in one screen (Taylor series) to that of the openings in the next smaller screen is  
 (a) 1.5 (b) 1  
 •/ N2 (d) none of these.  
 assumption that all particles in a single
5. Equivalent diameter of a particle is the diameter of the sphere having the same as the actual particle.  
 (a) ratio of surface to volume  
 (b) ratio of volume to surface  
 (c) volume  
 (d) surface

6. For coarse reduction of hard solids , use  
 (a) impact (fi) attrition  
 (c) compression (d) cutting
7. Soft & non-abrasive materials can be made into fines by  
 (a) attrition (fi) compression  
 (c) cutting (d) none of these
8. Crushing efficiency is the ratio of the  
 (a) surface energy created by crushing to the energy absorbed by the solid.  
 (b) energy absorbed by the solid to that fed to the machine.  
 (c) energy fed to the machine to the surface energy created by the crushing.  
 (d) energy absorbed by the solid to the surface energy created by the crushing.
9. Rittinger's crushing law states that  
 (a) work required to form a particle of any size is proportional to the square of the surface to volume ratio of the product.  
 (b) work required to form a particle of a particular size is proportional to the square root of the surface to volume ratio of the product.  
 (c) work required in crushing is proportional to the new surface created.  
 (d) for a given machine and feed, the crushing efficiency is dependent on the sizes of feed & product.

#### Answers

- |        |        |        |        |
|--------|--------|--------|--------|
| 1. (c) | 2. (b) | 3. (a) | 4. (d) |
| 7. (c) | 8. a)  | 9. (c) | 5. (c) |
|        |        |        | 6. (a) |

10. Bond crushing law  
 (a) calls for relatively less energy for the smaller product particles than does the Rittinger's law.  
 (b) is less realistic in estimating the power requirements of commercial crushers.  
 (c) states that the work required to form particle of any size from very large feed is proportional to the square root of the volume to surface ratio of the product.  
 (d) states that the work required for the crushing is proportional to the new surface created.
11. Work index is defined as the  
 (a) gross energy (kWh/ton of feed ) needed to reduce very large feed to such a size that 80% of the product passes a 100 micron screen.  
 (b) energy needed to crush one tonne of feed to 200 microns.  
 (c) energy (kWh/ton of feed) needed to crush small feed to such a size that 80% of the product passes a 200 mesh screen.  
 (d) energy needed to crush one ton of feed to 100 microns.
12. The operating speed of a ball mill should be ..... the critical speed.  
 (a) less than (b) much more than  
 (c) at least equal to (d) none of these
13. Wet grinding in a revolving mill ...compared to dry grinding.  
 (a) gives less wear on chamber walls  
 (b) requires more energy  
 (c) increases capacity  
 (d) complicates handling of the product
14. For the preliminary breaking of hard rock, we use a  
 (a) gyratory crusher  
 (b) ball mill  
 (c) tube mill  
 (d) squirrel-cage disintegrator
15. Fibrous material is broken by a  
 (a) roll crusher  
 (b) squirrel-cage disintegrator  
 (c) ball mill  
 (d) none of these.
- 6 As the product becomes finer, the energy required for grinding  
 (a) decreases  
 (b) increases  
 (c) is same as for coarser grinding.  
 (d) is 1.5 times that for coarser grinding.
17. Increasing the capacity of screen.....the screen effectiveness.  
 (a) decreases (b) increases  
 (c) does not affect (d) none of these.
- Screen efficiency is  
 (a) recovery/rejection  
 (b) recovery  
 (c) rejection  
 (d) none of these.
19. Traces of solids are removed from a liquid in a  
 (a) classifier  
 (b) clarifier  
 (c) sparkler filter  
 (d) rotary vacuum filter.
20. As particle size is reduced  
 (a) screening becomes progressively more difficult.  
 (b) screening becomes progressively easier.  
 (c) capacity & effectiveness of the screen is increased.  
 (d) none of these.

### Answers

- |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|
| 10. (a) | 11. (a) | 12. (a) | 13. (c) | 14. (a) | 15. (b) |
| 16. (b) | 17. (a) | 18. (d) | 19. (b) | 20. (a) |         |

21. A screen is said to be blinded, when the  
 (a) oversizes are present in undersize fraction.  
 (a) undersizes are retained in oversize fraction.  
 (c) screen is plugged with solid particles.  
 (d) screen capacity is abruptly increased.
22. Size measurement of ultrafine particles can be best expressed in terms of  
 (a) centimetre  
 (b) screen size  
 (c) micron  
 (d) surface area per unit mass
23. Ultrafine grinders operate principally by  
 (a) slow compression  
 (b) impact  
 (c) attrition  
 (d) cutting action.
24. Trommels separate a mixture of particles depending on their  
 (a) size  
 (b) density  
 (c) wettability  
 (d) electrical & magnetic properties.
25. The energy consumed by a ball mill depends upon  
 (a) its speed  
 (b) its ball load  
 (c) the density of the material being ground  
 (d) all (a), (b) & (c)
26. Grinding efficiency of a ball mill is of the order of. .... percent.  
 (a) 1-5 (b) 40-50  
 (c) **75-80** (d) **90-95**
27. Screen capacity is expressed in terms of  
 (a) tons/hr. (b) tons/m<sup>2</sup>  
 (c) both (a) & (b) (d) tons/hr.m<sup>2</sup>
28. Which of the following screens has the maximum capacity ?  
 (a) Grizzlies  
 (b) Trommels  
 (c) Shaking screens  
 (d) Vibrating screens
29. In classification, particles are said to be equal **settling**, if they have the same terminal velocities in the  
 (a) different fluids  
 (b) same fluid  
 (c) same field of force  
 (d) both (b) & (c).
30. Separation of particles of various sizes, shapes & densities by allowing them to settle in a fluid is called  
 (a) classification (b) froth floatation  
 (c) thickening (d) none of these
31. For beneficiation of iron ore, the most commonly used method is  
 (a) flocculation (b) froth floatation  
 (c) jigging & tabling (d) none of these
32. Froth floatations is most suitable for treating  
 (a) iron ores (a) sulphide ores  
 (c) quartzite (d) none of these
33. In case of a revolving mill, wet grinding compared to dry grinding  
 (a) requires more energy.  
 (b) has less capacity.  
 (c) complicates handling & classification of the product.  
 (d) none of these.
34. Which is the most suitable for transportation of sticky material ?  
 (a) Apron conveyor  
 (b) Belt conveyor  
 (c) Screw conveyor  
 (d) Pneumatic conveyor.

### Answers

21. (c)	22. (d)	23. (c)	24. (a)	25. (d)	26. (a)
27. (d)	28. (d)	29. (d)	30. (a)	31. (c)	32. (b)
33. (d)	34. (c)				

35. Ore concentration by Jigging is based on the ..... of the particles.  
 (a) difference in specific gravities  
 (b) wettability  
 (c) shape  
 (d) none of these.
36. For sizing of fine materials, the most suitable equipment is a  
 (a) trommel (b) grizzly  
 (c) shaking screen (d) vibrating screen.
37. Which of the following cannot be recommended for transportation of abrasive materials ?  
 (a) Belt conveyor (b) Apron conveyor  
 (c) Flight conveyor (d) Chain conveyor
38. In froth floatation, chemical agent added to cause air adherence is called the  
 (a) collector (b) frother  
 (c) modifier (d) activator
39. Pine oil used in froth floatation technique acts as a/an  
 (a) collector (b) modifier  
 (c) frother (d) activator
40. The most efficient equipment for removal of sub-micronic dust particles from blast furnace gas is the  
 (a) venturi atomiser.  
 (b) gravity setting chamber.  
 (c) electro-static precipitator.  
 (d) cyclone separator.
41. Float and sink test determines the possibility of cleaning of coal by a process based on the  
 (a) gravity separation  
 (b) wettability  
 (c) particle shape  
 (d) none of these.
42. Washability curve based on float and sink test enables an assessment to be made of the possibility of cleaning a coal fraction based on the  
 (a) density separation.  
 (b) differential wettability.  
 (c) particle size.  
 (d) volatile matter content.
43. For efficient grinding, ball mills must be operated  
 (a) at a speed less than critical speed.  
 (b) at a speed more than critical speed.  
 (c) at a speed equal to critical speed.  
 (d) with minimum possible small balls.
44. For the transportation of ultrafine particles, the equipment used is the ..... conveyor.  
 (a) belt (b) pneumatic  
 (c) screw (d) none of these
45. The material is crushed in a gyratory crusher by the action of  
 (a) impact (b) compression  
 (c) attrition (d) cutting
46. Mesh number indicates the number of holes per  
 (a) square inch (b) linear inch  
 (c) square foot (d) linear foot
47. For transporting pasty material, one will use the  
 (a) apron conveyor b/f d belt conveyor  
 (c) screw conveyor (d) bucket elevator.
48. Ball mill is used for the  
 (a) crushing (b) coarse grinding  
 (c) fine grinding (d) attrition

### Answers

35. (a)	36. (d)	37. (c)	38. (a)	39. (c)	40. (c)
41. (a)	42. (a)	43. (a)	44. (b)	45. (b)	46. (b)
47. (c)	48. (c)				

49. The capacity of a belt conveyor depends upon two factors. If one is the cross-section of the load, the other is the.....of the belt.  
 (a) speed (b) thickness  
 (c) length (d) none of these.
50. Dry powdery solid materials are transported by a. conveyor.  
 (a) belt (b) bucket  
 (c) screw (d) none of these.
51. Grizzlies are used for separating the..... solids.  
 (a) coarse (b) fine  
 (c) any size of (d) abrasive
52. Cyclones are used primarily for separating the  
 (a) solids (b) solids from fluids  
 (c) liquids (d) solids from solids.
53. The main differentiation factor between tube mill and ball mill is the  
 (a) length to diameter ratio.  
 (b) size of the grinding media.  
 (c) final product size.  
 (d) operating speed.
54. Fick's law relates to the  
 (a) energy consumption  
 (b) final particles size  
 (c) feed size  
 (d) none of these.
55. Apron conveyors are used for the  
 (a) heavy loads & short runs.  
 (b) small loads & long runs.  
 (c) heavy loads & long runs.  
 (d) small loads & short runs.
56. Sphericity of a non-spherical particles is given by  
 (a)  $V/DS$  (b)  $DS/V$   
 (c)  $6V/DS$  (d)  $V/6DS$

where,  $D$  — equivalent diameter of particles  
 $S$  — surface area of one particle  
 $K$  = volume of one particle

57. Sphericity of a cylindrical particles having equal length & diameter is  
 (a) 1 (b)  $> 1$   
 (c)  $< 1$  (d) 2
58. Sphericity of cube having its height as equivalent diameter is  
 (a)  $1/\sqrt{3}$  (b)  $\sqrt{3}$   
 (c) 1 (d)  $< 1$
59. Sphericity of crushed coal particles is  
 (a) 1 (b)  $> 1$   
 (c)  $< 1$  (d)  $\infty$
60. 200 mesh screen has 200 openings per  
 (a) inch (b)  $\text{inch}^2$   
 (c) cm (d)  $\text{cm}^2$
61. The mass flow rate of granular solid through a circular opening varies as the ..... of the opening diameter.  
 (a) square (b) cube  
 (c) square root (d) fourth power
62. Crushing efficiency of a crusher ranges between. ....percent.  
 (a) 0.1-2 (b) 10-15  
 (c) 15-25 (d) 40-50.
63. The crushing energy required to create new surface is given by the..... law.  
 (a) Rittinger's (b) Fick's  
 (c) Fourier's (d) all (a), (b) & (c).
64. Which mode of size reduction is used by jaw crushers ?  
 (a) Cutting (b) Impact  
 (c) Attrition (d) Compression.

### Answers

- |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|
| 49. (a) | 50. (c) | 51. (b) | 52. (b) | 53. (a) | 54. (a) |
| 55. (a) | 56. (c) | 57. (a) | 58. (c) | 59. (c) | 60. (a) |
| 61. (b) | 62. (a) | 63. (a) | 64. (d) |         |         |

65. Which of the following size reduction equipments can accept feed size  $> 25$  cms ?  
 (a) Tube mill  
 (b) Ball mill  
 (c) Fluid energy mill  
 (d) **Jaw** crusher
66. Reduction ratio (feed dia/product dia) for fine grinders may be  
 (a) 5 (b) 15  
 (c) 50 (d) as high as 100
67. Temperature of solid particles during grinding  
 (a) increases  
 (b) decreases  
 (c) remains constant  
 (d) may increase or decrease i depends on the nature of solid.
68. Large scale sedimentation is carried out in industries in  
 (a) cyclones (b) rotary filters  
 (c) thickeners (d) sorting classifiers
69. According to Bond crushing law, the work required to form particles of size  $d_p$  from very large feed is proportional to the of surface to volume ratio of the product.  
 (a) unit power (b) square  
 (c) square root (d) cube
70. Mechanical efficiency of a crusher is defined as the ratio of the  
 (a) energy supplied to the crusher to the energy created by crushing.  
 (b) surface energy created by crushing to the energy supplied to the crusher.  
 (c) energy absorbed by the solid to the energy supplied to the crusher.  
 (d) surface energy created by crushing to the energy absorbed by the solid.
71. The crushing efficiency of a crusher is the ratio of the  
 (a) energy supplied to the crusher to the surface energy created by crushing.  
 (b) surface energy created by crushing to the energy supplied to the crusher.  
 (c) energy absorbed by the solid to the energy supplied to the crusher.  
 (d) surface energy created by crushing to the energy absorbed by the solid.
72. The specific surface of spherical particles is .....the diameter of the particles.  
 (a) independent of  
 (b) proportional to the square of  
 (c) proportional to  
 (d) inversely proportional to
73. Which crusher is used for crushing coal blend for charging in coke ovens in steel plant ?  
 (a) Gyratory crusher  
 (b) Hammer crusher  
 (c) Jaw crusher  
 (d) Ball mills.
74. Coal middlings in thermal power plant are generally crushed by a  
 (a) hammer crusher  
 (b) ball mill  
 (c) jaw crusher  
 (d) gyratory crusher
75. Pick out the wrong statement.  
 (a) Grizzlies are used for coarse screening of large lumps and are of rugged construction.  
 (b) Trommels used for fairly large particles are rotating screens.  
 (c) Shaking & vibrating screens are used for fine sizing.  
 (d) all (a), (b) & (c).

### Answers

- |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|
| 65. (d) | 66. (d) | 67. (a) | 68. (c) | 69. (c) | 70. (c) |
| 71. (d) | 72. (d) | 73. (b) | 74. (b) | 75. (d) |         |

76. Which is a comminuting equipment ?

- (a) Trommel (b) Crusher  
(c) Classifier (d) Filter

77. Sorting classifiers separate particles of differing densities based on the ..... method.

- (a) sink and float  
(b) differential settling  
(c) both (a) & (b)  
(d) neither (a) nor (b).

78. Operating speed of trommels is about... times the critical speed.

- (a) 0.1 (b) 0.45  
(c) 1.s (d) 0.9

79. The critical speed of a trommel is ..... the diameter of the trommel.

- (a) proportional to  
(b) inversely proportional to  
(c) proportional to the square root of  
(d) inversely proportional to the square root of

80. The screen effectiveness....with increase in the capacity of the screen.

- (a) decreases (b) increases  
(c) increases linearly  
(d) remains unaffected

81. Critical speed of a ball mill is

$$\bullet) \frac{1}{2\pi} \sqrt{\frac{g}{R-r}} \quad *) \frac{1}{2\pi} \sqrt{\frac{R-r}{g}}$$

$$(c) \frac{1}{2\pi} \sqrt{\frac{g}{R-r}} \quad \frac{1}{r} \sqrt{\frac{rg}{R-r}}$$

where,  $r_i$  and  $r$  are radii of ball mill and balls respectively

82. Angle of nip ( $2\phi_i$ ) of a roll crusher is given by

$$(a) \tan \phi = \frac{dr + dp}{dr + df} \quad (b) \cos \phi = \frac{dr - df}{dr + dp}$$

$$(c) \cos \phi_i = \frac{dr + d_i}{dr + df} \quad (d) \tan \phi_i = \frac{dr - df}{dr + dp}$$

where  $d_i$ ,  $dp$  and  $d$ , are dia of crushing rolls. gap between the rolls and dia of feed particles respectively.

3 Which of the following is a rotating screen?

- (a) Grizzly Qj Trommel  
tc2 Shaking screen (d) None of these

84. Run of mine (ROM) coal is crushed by a..... for use in domestic ovens.

- (a) jaw crusher (b) hammer crusher  
(c) ball mill (d) tube mill

85. During filtration operation, the filtrate encounters the resistance of the

- (a) filter medium  
(b) cake

tc2 channel carrying the slurry to the upstream side of the cake and filtrate away from the filter medium.

- (d) all (a), (b) & (c)

86• In case of a plate and frame filter press, filtrate flow through the cake follows ..... flow.

- (a) plug (b) turbulent  
(b) laminar (d) none of these

87. Which one is a filter aid ?

- (a) Canvas fabric.  
(b) Diatomaceous earth,  
(c) Calcined lime.  
(d) None of these.

88. The filtrate flow rate in a constant pressure filtration

- (a) continuously increases.  
(b) continuously decreases,  
(c) remains constant throughout.  
(d) may increase or decrease i depends on the pressure.

### Answers

76. (b)	77. (c)	78. (b)	79. (d)	80. (a)	81. (a)
82. (c)	83. (b)	84. (b)	85. (d)	86. (c)	87. (b)
88. (b)					

89. Raw materials are charged in the iron blast furnace using  
 (a) bucket elevator (b) skip hoist  
 (c) screw conveyor (d) none of these.
90. Screw conveyors are  
 (a) run at very high rpm.  
 (b) suitable for sticky materials.  
 (c) suitable for highly abrasive materials.  
 (d) all (a), (b) & (c).
91. A belt conveyor used for the transportation of materials can  
 (a) run upto 1 km.  
 (b) travel at speed upto 300 metres/minute.  
 (c) handle upto 5000 tons/hr.  
 (d) all (a), (b) & (c).
92. The maximum slope of a belt conveyor can be ..... degrees.  
 (a) 15 (b) 30  
 (c) 45 (d) 60
93. Width and speed of a conveyor belt depends upon the .... of the material.  
 (a) lump size (b) bulk density  
 (c) both (a) & (b) (d) neither (a) nor (b).
94. Bucket elevators are not suitable for vertical lifting of the  
 (a) fine materials (e.g. -200 mesh size coal).  
 (b) sticky materials (e.g. clay paste).  
 (c) small lumpy materials (e.g. grains & sand).  
 (d) free flowing materials.
95. The capacity of a pneumatic conveying system depends upon the  
 (a) bulk density of materials.  
 (b) pressure of the conveying air.  
 (c) diameter of the conveying line.  
 (d) all (a), (b) & (c).
96. Which of the following must be stored in silos and not in open yard?  
 (a) Coke breeze  
 (b) High V.M. bituminous coal  
 (c) Sand  
 (d) B.F. coke
97. Reduction ratio of crushers is the  
 (a) ratio of feed opening to discharge opening.  
 (b) ratio of discharge opening to feed opening.  
 (c) determining factor for minimum dia of the feed & the product.  
 (d) none of these.
98. Grindability of a material does not depend upon its  
 (a) elasticity (b) hardness  
 (c) toughness (d) size
99. Which of the following gives the work required for size reduction of coal to -200 mesh in ball mill most accurately ?  
 (a) Rittinger's law (b) Kick's law  
 (c) Bond law (d) none of these
100. 200 mesh sieve size corresponds to .... microns.  
 (a) 24 (b) 74  
 (c) 154 (d) 200
101. In case of grinding in a ball mill,  
 (a) wet grinding achieves a finer product size than dry grinding.  
 (b) its capacity decreases with increasing fineness of the products.  
 (c) grinding cost & power requirement increases with increasing fineness of the products.  
 (d) all (a), (b) & (c)

### Answers

- |          |         |         |         |         |          |
|----------|---------|---------|---------|---------|----------|
| 89. (b)  | 90. (b) | 91. (d) | 92. (b) | 93. (c) | 94. (b)  |
| 95. (d)  | 96. (b) | 97. (a) | 98. (d) | 99. (a) | 100. (b) |
| 101. (d) |         |         |         |         |          |

102. Pick out the wrong statement pertaining to the roll crushers.  
 (a) Maximum feed size determines the required roll diameter.  
 (b) For hard materials's crushing, the reduction ratio should not exceed 4.  
 (c) Both the rolls run necessarily at the same speed.  
 (d) Reduction ratio and differential roll speed affect production rate & energy consumed per unit of surface product.
103. Horsepower required for a roll crusher is directly proportional to its  
 (a) reduction ratio (b) capacity  
 (c) both (a) & (b) (d) neither (a) nor (b).
104. In case of a hammer crusher,  
 (a) crushing takes place by impact breaking.  
 (b) maximum acceptable feed size is 30 cms.  
 (c) reduction ratio can be varied by adjusting the distance from cage to hammers.  
 (d) all (a), (b) & (c).
105. In case of a ball mill,  
 (a) coarse feed requires a larger ball.  
 (b) fine feed requires a larger ball.  
 (c) operating speed should be more than critical speed.  
 (d) none of these.
106. Which of the following is used for primary crushing of very hard lumpy materials ?  
 (a) Toothed roll crusher.  
 (b) Gyratory crusher.  
 (c) Ball mill.  
 (d) Tube mill.
107. In a roll crusher, both the rolls  
 (a) have the same diameter.  
 (b) are rotated towards each other.  
 (c) run either at same or different speeds.  
 (d) all (a), (b) & (c).
108. Power required to drive a ball mill with a particular ball load is proportional to  
 (a)  $D$  (b)  $1/D$   
 (c)  $D$  (d)  $1/D^2$   
 where,  $D$  — diameter of ball mill.
109. In case of a hammer crusher, the final product size depends upon the  
 (a) feed rate  
 (b) rotor speed  
 (c) clearance between hammer & grinding plates  
 (d) all (a), (b) & (c).
110. The grinding in hammer crusher takes place due to  
 (a) attrition (b) impact  
 (c) both (a) & (b)  
 (d) neither (a) nor (b).
111. In case of a hammer crusher,  
 (a) the feed may be highly abrasive (Moh's scale > 5).  
 (b) minimum product size is 3 mm.  
 (c) maximum feed size may be 50 mm.  
 (d) rotor shaft carrying hammers can be vertical or horizontal.
112. Limestone is normally crushed in a  
 (a) roll crusher (b) hammer crusher  
 (c) ball mill (d) tube mill
113. Coal is finally pulverised to 200 mesh size for burning in boilers by a  
 (a) hammer crusher. (b) ball mill  
 (c) roll crusher (d) gyratory crusher
114. Which of the following comes in the category of primary crusher for hard & tough stone ?  
 (a) Jaw crusher  
 (b) Cone crusher  
 (c) Gyratory crusher  
 (d) None of these

### Answers

102. (c)	103. (c)	104. (d)	105. (a)	106. (b)	107. (d)
108. (c)	109. (d)	110. (c)	111. (d)	112. (b)	113. (b)
114. (a)					

115. Which is a secondary crusher for a hard & tough stone ?  
 (a) Jaw crusher (b) Cone crusher  
 (b) Impact crusher (d) Toothed roll crusher
116. Filtrate flow rate in case of a rotary drum vacuum filter (in which  $R < R_c$ ) is proportional to. and the cycle time.  
 (a)  $\sqrt{\mu}$  (b)  $1/\sqrt{\mu}$   
 (c)  $1/\mu$  (d)  $1/\mu^2$   
 where,  $\mu$  = filtrate viscosity  
 $R_m$  = filter medium resistance  
 $R_c$  - cake resistance
117. Out of the following size reduction equipments, the maximum feed size can be accepted by the  
 (a) tube mill (b) ball mill  
 (c) jaw crusher (d) jet pulveriser
118. Pick out the wrong statement.  
 (a) Hammer crushers operate by impact action.  
 (b) Standard screens have circular opening.  
 (c) With increase in mesh number of screens their diameter in microns decreases.  
 (d) 200 mesh screen has 200 openings per linear cm.
119. Trommels employ.....for screening of materials.  
 (a) fibrous cloth (b) woven wire screen  
 (c) punched plate (d) none of these
120. Electrical energy consumed by a jaw crusher is not a function of the  
 (a) average feed size  
 (b) average product size  
 (c) machine capacity  
 (d) none of these
121. In a size reduction crushing operation, feed size is 300 to 1500 mm, while the product size is 100 to 300 mm. This is a case of..... crushing.  
 (a) secondary (b) fine  
 (c) primary (d) ultrafine
122. 'Xanthates' are used in the froth floatation process as a/an  
 (a) conditioner (b) frother  
 (c) collector (d) activator
123. Screen capacity is not a function of the  
 (a) openings size  
 (b) screening mechanism  
 (c) screening surface  
 (d) atmospheric humidity
124. Gold ore concentration is mostly done using  
 (a) jigging (b) tabling  
 (c) froth floatation (d) elutriation
125. Activators are those chemicals which help buoying up one mineral in preference to the other in the froth floatation process. Which of the following is an activator?  
 (a) Cresylic acid  
 (b) Copper sulphate  
 (c) Calcium carbonate  
 (d) Sodium carbonate
126. Pick out the wrong statement.  
 (a) Magnetic separation method can be employed to treat both dry & wet ores.  
 (b) Reduction ratio in crushing operation is defined as the ratio of minimum feed size to the maximum product size.  
 (c) Gyratory crusher is used for the coarse crushing.  
 (d) Screens are of stationary, moving and vibratory types.

### Answers

- |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| 115. (b) | 116. (b) | 117. (c) | 118. (d) | 119. (c) | 120. (d) |
| 121. (c) | 122. (c) | 123. (d) | 124. (b) | 125. (b) | 126. (b) |

127. Trommels are revolving screens, which normally operate in the range of rpm.  
 (a) **1-2** (b) **15-20**  
 (c) **40-50** (d) **60-75**
128. Fluid medium used in the classification technique of mineral beneficiation is  
 (a) air  
 (b) water  
 (c) either (a) or (b)  
 (d) neither (a) nor (b)
129. Pine oil and cresylic acid are used as the in froth floatation process.  
 (a) frother (b) collector  
 (c) depressor (d) conditioner
130. Which of the following parts of a jaw crusher is subjected to maximum wear and tear during its operation ?  
 (a) Check plates (b) Jaw plates  
 (c) Toggles (d) Crush shaft
131. The constants  $\phi K$ ,  $K$  &  $K_j$  used in the laws of crushing (i.e. Bond's law, Rittinger's law & Kick's law) depend upon the  
 (a) feed material  
 (b) type of crushing machine  
 (c) both (a) & (b)  
 (d) neither (a) nor (b)
132. General mechanism of size reduction in intermediate and fine grinder is by  
 (a) cutting action  
 (b) compression  
 (c) compression & tearing  
 (d) impact & attrition
133. Length/diameter ratio of a ball mill is  
 (a) 1.5 (b) 1  
 (c)  $<1$  (d)  $>1$
134. The crushed material received for separation is called feed or  
 (a) tailing (b) heading  
 (c) concentrate (d) middling
135. Screen capacity is proportional to  
 (a)  $S$  (b)  $1/S$   
 (c)  $S^2$  (d)  $US$   
 where,  $S$  — screen aperture
136. Size reduction of asbestos and mica is done by  
 (a) hammer mills  
 (b) rod mills  
 (c) gyratory crushers  
 (d) crushing rolls
137. Tube mill compared to ball mill  
 (a) produces finer products.  
 (b) is larger in comparison with its diameter.  
 (c) uses smaller balls.  
 (d) all (a), (b) & (c)
138. Use of grinding aids results in  
 (a) enhanced production rate  
 (b) finer products  
 (c) both (a) & (b)  
 (d) neither (a) nor (b)
139. Size reduction of.....can be suitably done by ball mills, crushing rolls and rod mills.  
 (a) metalliferous ores  
 (b) non-metallic ores  
 (c) basic slags  
 (d) asbestos and mica
140. ....mill fall in the category of tumbling mills.  
 (a) Ball and pebble  
 (b) Rod and tube  
 (c) Compartment  
 (d) all (a), (b) & (c)

### Answers

127. (b)	128. (c)	129. (a)	130. (b)	131. (c)	132. (d)
133. (c)	134. (b)	135. (a)	136. (a)	137. (d)	138. (d)
139. (a)	140. (d)				

141. Toothed roll crushers achieve size reduction by  
 (a) tearing (shear) & compression  
 (h) impact & attrition  
 (c) both (a) & (b)  
 (d) neither (a) nor (b)
142. Colloid mills achieve size reduction mainly by  
 (a) impact (b) attrition  
 (c) cutting (d) compression
143. Ball mills and tube mills with flint or porcelain balls are used for the size reduction of  
 (a) asbestos  
 (b) rubber  
 (c) non-metallic ores  
 (d) limestone
144. Energy consumption in a crusher decreases with increase in the  
 (a) size of product (at constant feed size).  
 (b) capacity of the crushing machine.  
 (c) size of feed (at constant reduction ratio).  
 (d) all (a), (b) & (c).
145. Which of the following terminology is not used for the size reduction of materials to fine sizes or powders?  
 (a) Comminution (b) Dispersion  
 (c) Pulverisation (d) Compression
146. Size reduction does not occur due to compression in case of  
 (a) rod mills  
 (b) gyratory crushers  
 (c) jaw crushers  
 (d) smooth roll crushers
147. Basic slag is not ground in

- (a) jaw crushers  
 (b) ball mills  
 (c) compartment mills  
 (d) tube mills

148. Specific surface area is the surface area of a unit. .... of material.

- (a) weight  
 (b) volume  
 (c) either (a) or (b)  
 (d) neither (a) nor (b)

149. What is the reduction ratio in a fine crushing operation having following feed & product sizes?

Parameters	Suit	Maximtim	Mining um
Feed size	mm	20	10
Product size	mm	10	5

- (a) 0.5 (b) 2  
 (c) 5 (d) 10

150. The term 'angle of nip' is concerned with the operation of. .... crushers.

- (a) jaw (b) roll  
 (c) gyratory (d) none of these

151. Which of the following achieves the least reduction ratio for a given feed size?

- (a) Jaw crusher  
 (b) Roll crusher  
 (c) Cone crusher  
 (d) Gyratory crusher

152. Two particles are called to be equal settling, if they are of the same

- (a) size  
 (b) specific gravity  
 (c) terminal velocities in the same fluid and in the same field of force.  
 (d) none of these.

### Answers

141. (c) 142. (b) 143. (e) 144. (d) 145. (d) 146. (a)  
 147. (a) 148. (e) 149. (b) 150. (b) 151. (b) 152. (c)

153. .... is defined as the geometric mean of the relative rejections and the relative recoveries of two minerals.  
 (a) Separation efficiency  
 (b) Selectivity index  
 (c) Concentration ratio  
 (d) none of these
154. Which of the following minerals is not subjected to magnetic separation method?  
 (a) Rutile (b) Galena  
 (c) Chromite (d) Siderite
155. The study on washability of coal is done by using ..... technique.  
 (a) tabling  
 (b) elutriation  
 (c) heavy media separation  
 (d) none of these
156. During size reduction by a jaw crusher, the energy consumed decreases with the  
 (a) decreasing size of product at constant size of feed.  
 (b) decreasing machine capacity.  
 (c) increasing size of feed at constant reduction ratio.  
 (d) none of these
157. Pick out the correct statement.  
 (a) Removal of iron from ceramic material is necessitated (by magnetic separation method) so as to avoid discolouration of ceramic products.  
 (b) The operating cost of shaking screen is more than that of a vibrating screen.  
 (c) Screen capacity does not depend upon the specific **gravity** of the minerals.  
 (d) Asphalt is best crushed using toothed roll crusher.
158. Sauter mean diameter is same as the ..... mean diameter.  
 (a) mass (b) arithmetic  
 (c) volume—surface (d) geometric
159. Gummy & sticky materials like molasses, sugar etc. are best transported/handled by using a..... conveyor.  
 (a) drag (b) ribbon  
 (c) screw (d) slat
160. Hot, lumpy and abrasive materials are best transported by using a/an. conveyor.  
 (a) apron (b) belt  
 (c) screw (d) flight
161. Which of the following is a coarse crusher?  
 (a) Smooth roll crusher  
 (b) Toothed roll crusher  
 (c) Gyratory crusher  
 (d) Tube mill
162. mills are termed as impactors.  
 (a) Hammer  
 (b) Cage  
 (c) Rolling-compression  
 (d) None of these
- 163.** Which of the following is not a revolving/tumbling mill for size reduction?  
 (a) Compartment mill  
 (b) Pebble mill  
 (c) Cage mill  
 (d) Rod mill
164. Stamp mills are generally used for crushing  
 (a) iron ores  
 (b) gold ores  
 (c) talc  
 (d) diamond

### Answers

153. (b)	154. (b)	155. (c)	156. (c)	157. (a)	158. (c)
159. (b)	160. (a)	161. (c)	162. (a)	163. (c)	164. (b)

165. Size reduction of fibrous materials like wood, asbestos, mica etc. is done by a disintegrator, exemplified by a  
 (a) Blake jaw crusher (b) cage mill  
 (c) stamp mill (d) Bradford's breaker
166. Balls for ball mills are never made of  
 (a) forged/cast steel  
 (b) lead  
 (c) cast iron  
 (d) alloy steel
167. For achieving maximum capacity of the ball mill, the ball charge should be equal to..... percent of the mill volume.  
 (a) 10 (b) 25  
 (c) 50 (d) 75
168. mills are termed as disintegrators.  
 (a) Cage (b) Compartment  
 (c) Pebble (d) All tumbling
169. Which of the following is a fine crusher?  
 (a) Blake jaw crusher  
 (b) Gyratory crusher  
 (c) Toothed roll crusher  
 (d) Dodge jaw crusher
170. ....mill is normally used for grinding of talc.  
 (a) Tube (b) Compartment  
 (c) Ring-roll (d) Pebble
171. Gravity settling process is not involved in the working of  
 (a) hydrocyclones (b) classifiers  
 (c) dorr-thickener (d) sedimentation tank
172. are used for the separation of coarse particles from a slurry of fine particle.  
 (a) Thickeners (b) Classifiers  
 (c) Hydrocyclones (d) Decanters
173. A .....employs a set of screen across a flow channel for the separation of dirt/rust from a flowing liquid stream.  
 (a) thickener (b) classifier  
 (c) strainer (d) clarifier
174. The process by which fine solids is removed from liquids is termed as the  
 (a) decantation (b) flocculation  
 (c) sedimentation (d) classification
175. balls capable of grinding the feed in a ball mill gives the maximum efficiency.  
 (a) Cast iron (b) Minimum size  
 (c) Maximum size (d) Elliptical
176. The value of angle of nip' is generally about  
 (a)  $16^\circ$  (b)  $32^\circ$   
 (c)  $52^\circ$  (d)  $64^\circ$
177. Use of grinding aids is done in.....grinding.  
 (a) dry (b) wet  
 (c) ultrafine (d) intermediate
178. Separation of materials into products based on the difference of their sizes is called  
 (a) sizing (b) sorting  
 (c) classification (d) flocculation
179. There is practically no alternative/competitor to .....in the beneficiation treatment of sulphide ores.  
 (a) classification (b) tabling  
 (c) jigging (d) froth floatation
180. Vertical transportation of materials can be done by a/an  
 (a) apron conveyor  
 (b) pneumatic conveyor  
 (c) bucket elevator  
 (d) boty (b) & (c)

### Answers

165. (b)	166. (b)	167. (c)	168. (a)	169. (c)	170. (c)
171. (b)	172. (c)	173. (c)	174. (b)	175. (b)	176. (b)
177. (a)	178. (d)	179. (d)	180. (d)		

181. conveyors are also called scrappers.  
 (a) Apron (b) Screw  
 (c) Helical flight (d) both (b) & (c)
182. Solid particles separation based on the difference in their flow velocities through fluids is termed as the  
 (a) clarification (b) classification  
 (c) elutriation (d) sedimentation
183. Sizing of very fine particles of the order of 5 to 10 microns is done by elutriation, which is a ..... operation.  
 (a) clarification (b) sedimentation  
 (c) flocculation (d) classification
184. Separation of materials of the same density based on their sizes by using their different rates of flow is called  
 (a) sorting (b) sizing  
 (c) flocculation (d) elutriation
185. The equipment which helps in the removal of traces of solids from a liquid is called a  
 (a) classifier  
 (b) clarifier  
 (c) sedimentation tank  
 (d) flocculator
186. conveyor is the most suitable for long distance transportation of cold, non- abrasive granular/irregular shape/fine materials.  
 (a) Bucket (b) Belt  
 (c) Screw (d) Apron
187. A widely used size reduction equipment for..... is the Bradford breakers.  
 (a) talc (b) coal  
 (c) iron-ore (d) wheat
188. battles are provided in ball mills.  
 (a) Horizontal (b) No  
 (c) Only two (d) Vertical
189. Separation of solid particles based on their densities is called  
 (a) sizing (b) sorting  
 (c) clarification (d) dispersion
190. Handling of ashes and similar materials can be done best by a ..... conveyor.  
 (a) flight (b) drag or slat  
 (c) belt (d) ribbon
191. For spheres, the surface shape factor is given by  
 (a)  $n(=A/D^2)$  (b)  $n/6(=V/D')$   
 (c)  $AD/V$  (d)  $V/AD$   
 where,  $A$  — area,  $K$  = volume and  $D$  - diameter
192. Pick out the wrong statement.  
 (a) Recycled coarse material to the grinder by a classifier is termed as the circulating load.  
 (b) Wear and tear in wet crushing is more than that in dry crushing of materials.  
 (c) Size enlargement (opposite of size reduction) is not a mechanical operation.  
 (d) A 'dust catcher' is simply an enlargement in a pipeline which permits the solids to settle down due to reduction in velocity of the dust laden gas.
193. If a force greater than that of gravity is used to separate solids and fluids of different densities, the process is termed as the  
 (a) sedimentation (b) flocculation  
 (c) dispersion (d) centrifugation

### Answers

181. (d)	182. (b)	183. (d)	184. (b)	185. (b)	186. (b)
187. (b)	188. (a)	189. (b)	190. (b)	191. (a)	192. (c)
193. (d)					

194. The process opposite to 'dispersion' is termed as the

- (a) flocculation (b) sedimentation  
(c) filtration (d) clarification

195. For spheres, volume shape factor is given by

- (a)  $a (= A/ff)$  (b)  $2a (= 2A/D^2)$   
(c)  $a/6 (= V/D^3)$  (d)  $AD/V$

196. Size reduction of ice and gypsum can be accomplished suitably by a.....crusher.

- (a) Blake jaw (b) toothed roll  
(c) gyratory (d) none of these

197. For spheres, the specific surface shape factor is given by

- (a)  $AD/V$  (b)  $D/V$   
(c)  $A/V$  (d)  $D/V^2$

198. In coal washeries, three products namely the valuable product (*i.e* clean/washed coal), discarded product (*i.e.*, mineral matter) and an additional concentrated product called the..... is produced.

- (a) concentrate (b) tailing  
(c) middling (d) none of these

199. Separation of solid suspended in liquid into a supernatant clear liquid and a denser slurry employs a process termed as the

- (a) coagulation (b) flocculation  
(c) sedimentation (d) clarification

200. Which of the following grinding mills has the horizontally arranged rods as the grinding elements, thereby delivering more uniform granular product with minimum fines ?

- (a) Compartment mill (b) Rod mill  
(c) Pebble mill (d) Tube mill

201. In ball mill operation, the feed size ( $D$ , in metres) and the ball diameter ( $D_b$  in metres) are related as

- (a)  $D_b^2 = K.D^2$  (b)  $D_b = K.D$   
(c)  $D_b = K.D$  (d)  $D_b^2 = K.D^2$

where,  $K$  — grindability constant (varying from 0.9 to 1.4 in increasing order of hardness)

202. The optimum moisture content in solids to be crushed/ground ranges from percent.

- (a) 3 to 4 (b) 8 to 10  
(c) 10 to 15 (d) 15 to 20

203. Pick out the wrong statement.

- (a) Gape is the greatest distance between the crushing surfaces or the jaws.  
(b) The angle of nip ( $2\alpha$ ) is the angle between roll faces at the level where they will just take hold of a particle and draw it in the crushing zone.  
(c) Crushing efficiency is the ratio of the energy absorbed by the solid to the surface energy created by crushing.  
(d) Reduction ratio is the ratio of the maximum size of the particles in the feed to that in the product.

204. Critical speed of rotation,  $N$  (in rps-rotation per second) of a trommel is equal to

- (a)  $\frac{1}{2\pi} \sqrt{\frac{g}{r}}$  (b)  $\frac{1}{\pi} \sqrt{\frac{g}{r}}$   
(c)  $\frac{1}{2} \sqrt{\frac{g}{r}}$  (d)  $2\pi \sqrt{\frac{g}{r}}$

where,  $g$  = acceleration due to gravity  
=  $9.81 \text{ m/sec}^2$  and,  $r$  — radius of trommel, metre

205. Energy consumed for crushing one ton of material ranges from.....kWh.

- (a) 0.01 to 0.1 (b) 0.5 to 1.5  
(c) 2 to 3.5 (d) 4 to 5

### Answers

194. (a)  
200. (b)

195. (c)  
201. (a)

196. (b)  
202. (a)

197. (a)  
203. (c)

198. (c)  
204. (a)

199. (c)  
205. (b)

206. Capacity (in tons/hr) of jaw/gyratory crusher is equal to

- (a) 0.01 £.5 (b) 0.087 £.5  
(c) £.S (d) £.6/0.087

where, L = length of the receiving opening, cm

S = greater width of the discharge opening, cm

207. mill is not a revolving mill.

- (a) Pebble (b) Compartment  
(c) Cage (d) Tube

208. A ..... mill is a revolving mill divided into two or more sections by perforated partitions, in which preliminary grinding takes place at one end and the finishing grinding at the discharge end.

- (a) compartment (b) tube  
(c) rod (d) pebble

209. In closed circuit grinding as compared to open circuit grinding, the

- (a) specific surface of product is more.  
(b) product has lesser size uniformity.  
(c) production rate at a given limiting size is lower.  
(d) operation is economical.

210. Capacity of flight conveyor in tons/hr is given by

- (a)  $3.6 IV \cdot D \cdot V \cdot p$  (b)  $3.6 W \cdot D \cdot V$   
(c)  $3.6 W V p$  (d)  $3 \cdot 6 D V p$

where, W & D — width & depth of flight respectively in metre

K - speed of the conveyor, metre/second  
p = bulk density of material, kg/m<sup>3</sup>

211. A cottrel precipitator makes use of the ..... for dusty air cleaning.

- (a) electric spark  
(b) corona discharge

- (c) alternating current  
(d) low voltage

212. Gyratory crushers compared to the reciprocating jaw crushers

- (a) have greater capacity per unit of discharge area.  
(b) crush intermittently.  
(c) are less suitable for coarse materials.  
(d) have less steady power consumption.

213. Kick's law assumes that the energy required for size reduction is proportional to logarithm of the ratio between the initial & the final diameters. The unit of Kick's constant is

- (a) kW.sec./kg (b) kWh/kg  
(c) kWh/sec.kg (d) kg/sec

214. Theoretical capacity of crushing rolls in tons/hr is given by

- (a)  $3.6 V \cdot W \cdot D \cdot p$  (b)  $3.6 V \cdot W \cdot p$   
(c)  $3.6 W \cdot D \cdot p$  (d)  $3.6 V \cdot W \cdot D \cdot p$

where, V = peripheral velocity, m/sec. W = width of rolls, m

D, — distance between rolls

p = density of material to be crushed, kg/m<sup>3</sup>  
here,  $V = n \cdot N \cdot D$  where,

N — speed of rolls in rotation per second

D — diameter of rolls, m

215. Vibrating screens are used for handling large tonnages of materials. The vibrating motion is imparted to the screening surface by means of

- (a) electromagnets.  
(b) cams or eccentric shafts.  
(c) unbalanced flywheels.  
(d) either 'a', 'b' or 'c'

### Answers

- |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| 206. (b) | 207. (c) | 208. (a) | 209. (d) | 210. (a) | 211. (b) |
| 212. (a) | 213. (a) | 214. (a) | 215. (d) |          |          |

216. Pick out the correct statement.
- The capacity and the effectiveness of a screen are the same.
  - The capacity and the effectiveness of a screen are opposing factors.
  - The screening surface of a 'reel' (a revolving screen used in flour mills) is made of silk bolting cloth supported by wire mesh.
  - both 'b' & 'c'
217. Wet sieving is employed, when the product contains .....materials.
- abrasive
  - large quantity of very fine
  - coarse
  - non-sticky
218. The capacity of a classifier in 'tons of solid/hr' is given by
- 3.6 AVS.p
  - 3.6A.V.p
  - 3.6 A.V.p
  - 3.6 AVS/p
- where, A — cross-sectional area, m<sup>2</sup>  
 K = rising velocity of fluid, m/sec  
 S = percentage of solids in the suspension by volume  
 fi = density of solids, kg/m<sup>3</sup>
219. Which of the following is a batch sedimentation equipment ?
- Dust catcher
  - Filter thickener
  - Dry cyclone separator
  - Rotary sprayer scrubber
220. Pick out the correct statement.
- Angle of repose is always greater than the angle of slide.
  - A hopper is a small bin with a sloping bottom.
  - A silo is a short height vessel of very

- large diameter used for the storage of high volatile matter coal.
- Pine oil is used as a 'modifying agent' (for activating or depressing the adsorption of filming agents) in froth floatation process.
221. Agglomeration of individual particles into clusters (flocs.) is called flocculation. To prevent flocculation, the most commonly used dispersing agents are
- carbonates
  - sulphates
  - silicates & phosphates
  - bi-carbonates
222. .... mean diameter of particles is given by  $\sum x_i D_{pi}$ .
- Mass
  - Volume
  - Arithmetic
  - Volume surface
223. Which of the following equations is **Rittingers** crushing law ?
- $P/m \propto W/D$
  - $P/m \propto \sum \ln(D_{sa} \sqrt{D_{sb}})$
  - $P/m = K \left[ \frac{1}{D_{sb}} - \frac{1}{D_{sa}} \right]$
  - none of these
- where, P = power required by the machine,  
 m = feed rate, K — a constant  
 D<sub>sa</sub> & D<sub>sb</sub> = volume surface mean diameter of feed & product respectively
224. General crushing equation is given by
- $$d \left( \frac{P}{m} \right) = -K \frac{dD}{D^n}$$
- Bond's crushing law is obtained by solving this equation, for n = ..... and feed of infinite size.
- 1
  - 1.5
  - 2
  - 2.5

### Answers

- |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| 216. (d) | 217. (b) | 218. (a) | 219. (b) | 220. (b) | 221. (c) |
| 222. (b) | 223. (c) | 224. (b) |          |          |          |

225. Pick out the correct statement.

- (a) Plastic chips are called non-cohesive solids.

(b) Kick's crushing law is,

$$m = -K \ln \left( \frac{D_n}{fD} \right)$$

(c) Comminution is a generic term for the size enlargement operation.

- (d) Energy required in kWh per ton of product such that 80% of it passes through a 200 mesh screen is called 'Work index'.

226. Pick out the wrong statement.

- (a) More commonly used jaw crusher between Dodge jaw crusher and Blake jaw crusher is the latter one.
- (b) There are only four methods namely compression, impact, attrition & cutting which the size reduction equipments employ.
- (c) Cutting machines mainly employ 'attrition' for size reduction of solids.
- (d) Operating principles of Dodge & Blake jaw crushers are combined in the working of universal jaw crushers.

227. Tabling process used for separating two materials of different densities by passing the dilute pulp over a table/deck, which is inclined from the horizontal surface at an angle of about

- (a) 1 to 2°                      (b) 2 to 5°  
(c) 5 to 10°                    (d) 10 to 15°

228. Grinding characteristic of a material is given by its

- (a) Hardgrove grindability index (HGI)  
(b) angle of repose  
(c) shatter index  
(d) abrasion index.

229. Which of the following relationships between coefficient of friction between rock & roll and  $\phi$  (half of the angle of nip) of the particle to be crushed is correct?

- (a)  $q > \tan \phi$                       (b)  $\tan \phi < q$   
(c)  $q > \tan 2\phi$                     (d)  $q < \tan \phi$

230. The mechanism of size reduction by a hammer mill is by impact & attrition between the

- (a) grinding element & housing.  
(b) feed particles.  
(c) both (a) & (b).  
(d) neither (a) nor (b).

**231.** Actual operating speed of a ball mill may vary from 65 to 80% of the critical speed. Which of the following duties would require the ball mill to be operated at maximum percentage of critical speed?

- (a) Wet grinding in low viscous suspension.  
(b) Wet grinding in high viscous suspension.  
(c) Dry grinding of large particles (upto 1.25 cms).  
(d) Dry grinding of large particles in unbaffed mills.

232a A pebble mill

- (a) is a ball mill.  
(b) employs flints of ceramic pebbles as the grinding medium.  
(c) is a tube mill lined with ceramic or other non-metallic liner.  
(d) both (b) & (c).

233' Number of particles in a crushed solid sample is given by

- (a)  $m/p \cdot V_p$                       (b)  $m \cdot p/V_p$   
(c)  $\frac{m}{p} \cdot \frac{V_p}{p}$                       (d)  $\frac{m}{p} \cdot \frac{p}{V_p}$

where,  $m$  = mass of particles in a sample,

$V_p$  — volume of one particle and  $p$  =

density of particles.

### Answers

- |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| 225. (b) | 226. (c) | 227. (b) | 228. (a) | 229. (c) | 230. (c) |
| 231. (d) | 232. (c) | 233. (a) |          |          |          |

234. Introduction of slurry in a plate and frame filter press is done through a plate in each frame. The plate of this filter has a .....surface.

- (a) plane (b) curved  
(c) ribbed (d) either (a) or (b)

235. Which of the following is the most suitable filter for separation of abrasive solids suspended in a corrosive liquid ?

- (a) Sand bed filter  
(b) Plate and frame filter press  
(c) Vacuum filter  
(d) Batch basket centrifuge.

236. rpm of a trommel at critical speed is given by

- ( ) **76.65 / D** (b) **76.65/ID**  
(c) **76.75 /O** (d) **76.75 ID**

where,  $D$  — Diameter of trommel in ft.

237. Which of the following crushing laws is most accurately applicable to the fine grinding of materials ?

- (a) Bond's crushing law  
(b) Kick's law  
(c) Rittinger's law  
(d) None of these

238. Rittinger number, which designates the new surface produced per unit of mechanical energy absorbed by the material being crushed, depends on the

- (a) state or manner of application of the crushing force.  
(b) ultimate strength of the material.  
(c) elastic constant of the material.  
(d) all (a), (b) & (c).

239. Match the following pulverisers as per their characteristics.

#### List I

- (a) It combines the action of hammer & attrition mills and is used for grinding plastic materials liable to be softened under warm mill conditions.  
(b) It is a tumbling mill comprising of a cylinder divided into two or more section by a perforated partition, in which preliminary grinding takes place at one end and final grinding at the discharge end.  
(c) It is an attrition mill with hard circular emery rock serving as grinding medium used for grinding special cereals and grains.  
(d) This mill, in which the journals carrying the grinding rollers are stationary while the grinding ring rotates, is used for pulverising coal for boiler firing.

#### List II

- I. Buhrstone mill  
II. Bowl mill  
III. Compartment mill  
IV. Turbo pulveriser

240. Match the following conveying equipments with their field of application.

#### List I

- (a) Skip hoist  
(b) Bucket elevator  
(c) Pneumatic conveyor  
(d) Screw conveyor with ribbon flight

#### List II

- I. Movement of blast furnace charge.  
II. Handling of sticky materials.  
III. Vertical movement of free flowing pulverised coal.  
IV. Domestic dust cleaning by vacuum cleaner.

### Answers

234. (c)      235. (c)      236. (b)      237. (c)      238. (d)      239. a-IV, b-III, c-I, d-II  
240. a-I, b-III, c-IV, d-II

241. Match the type of size reduction equipments with their examples.

*List I*

- (a) Shredder
- (b) **Jaw** crusher
- (c) **Heavy duty** impact mill
- (d) Peripheral speed mill

*List II*

- I. Hammer mill
- II. Cage disintegrator
- III. Buhrstone
- IV. Dodge crusher

242. Match the proper size reduction equipment used for various applications.

*List I*

- (a) size reduction of ice
- (b) Pulverisation of coal middling
- (c) Grinding of talc
- (d) Crushing of gold ore.

*List II*

- I. Stamp mill
- II. Toothed roll crusher
- III. Ball mill
- IV. Ring roll mill

243. Match the typical transportation applications of various conveyors.

*List I*

- (a) Transportation of sticky, pasty and dry powdery solid materials.
- (b) Not fit for transportation of abrasive materials.
- (c) Transportation of ultrafine materials.
- (d) Not fit for vertical lifting of sticky materials.

*List II*

- I. Flight conveyor
- II. Screw conveyor

III. Bucket elevator

IV. Pneumatic conveyor

244. Match the crushing action involved in the operation of various size reduction equipments.

*List I*

*List II*

- (a) Gyratory crusher I. Cutting action
- (b) Colloid mill II. Compression
- (c) Hammer crusher III. Attrition
- (d) Dicer or slitters ...IV. Both attrition & impact

245. Match the crushers used for various applications.

*List I*

- (a) Size reduction of fibrous materials like asbestos, mica etc.
- (b) Primary crushing of hard and tough stone.
- (c) Limestone crushing.
- (d) Pulverisation of carbon black.

*List I*

- I. Ball mill II. Cage mill
- III. Jaw crusher IV. Hammer crusher

246. Match the techniques/principle employed in various separation processes.

*List I*

- (a) Sorting (b) Sizing
- (c) Classification (d) Clarification

*List II*

- I. Separation of materials of same density based on their sizes by using their different rates of flow.
- II. Removal of traces of solid from a liquid.
- III. Separation of solid particles based on their densities.
- IV. Separation of solid particles based on the difference in their flow velocities through fluids.

### Answers

241. a-II, b-IV, c-I, d-III

242. a-II, b-III, c-IV, d-I

243. a-II, b-I, c-IV, d-III

244. a-II, b-III, c-IV, d-I

245. a-II, b-III, c-IV, d-I

246. a-III, b-I, c-IV, d-II