76762

M.Tech. II Semester Degree Examination, September/October - 2022
MINERAL PROCESSING
21MNP2C6L : COMMINUTION AND SIZING

Time : **3** Hours
Maximum Marks : **70**

Instructions : *(i)   Question number **1** is **compulsory**.*

*(ii)   Answer **any 5** of the following.*

1. (a)   Explain the importance of physical properties of ores in mineral processing.   **7**

(b)   What do you mean by the term 'Sample' ? Explain any one sampling method.   **7**

2.   Explain the working principle of gyratory crusher with a line diagram.   **14**

OR

Explain roll crusher and deduce an equation for angle of nip.

.3.   (a)   A rock of average particle size of 25 mm is crushed to a product of average   **7**
particle size of 6 mm at a rate of 10 tons/hr. At this rate, the mill takes
18 kW power. It requires 0.5 kW to run mill empty. What will be the power
consumption if the same feed is crushed to a particle diameter of 10 mm ?
Assume that Rittinger's law is valid.

(b)   A lead and zinc ore being ground from a feed size of 80% passing 3 mesh to a   **7**
product size of 80% passing 100 mesh for floatation treatment and power
consumption is 7.2 kW hr per ton of ore ground. Because of the changing
nature of the ore with increased depth of mining, the metallurgical recovery
can only be maintained by finer grinding. Test work has indicated that by
crushing the feed to 80% passing 4 mesh and grinding in a ball mill to 80%
passing 325 mesh, recoveries will be satisfactory. Calculate the power
required to grind one ton of ore under the new conditions, according to
Bond's law.

*(Note : Mesh sizes for 3, 4, 100 and 325 are 6730, 4760, 149 and 37 microns
respectively)*

4. Graphically represent the below shown sieve analysis test data and find out d50, **14** d80.

Mesh number	Retained mesh size in microns	Weight of material in g
+ 12	1410	6.53
− 12 + 14	1190	23.25
− 14 + 20	840	29.50
− 20 + 28	595	32.23
− 28 + 35	420	24.52
− 35 + 48	297	20.48
− 48 + 65	210	19.35
− 65 + 100	149	14.00
− 100 + 150	105	15.22
− 150 + 200	74	9.70
− 200		55.22

5. (a) Explain cascading and cateracting in ball mills. **7**

   (b) Deduce the equation for critical speed of a ball mill. **7**

<p align="center">**OR**</p>

Write a note on open circuit and closed circuit crushing operation, with necessary **14** circuit diagrams.

6. Discuss the grinding mills and add a note on types of feeders in wet mills. **14**

7. An ore particle contains 80% by weight of fine particles. To remove these fines, it **14** is screened at the rate of 250 tons/h using 1.8 mm screen. Overflow and underflow products are sampled and analysed. It is found that +1.8 mm material in overflow and underflow products are 40% and 10% respectively. Estimate the tonnage of fines removed in underflow and tonnage of fines left in overflow. Calculate the efficiency of the screen in separating undersize material and oversize material. Also calculate overall efficiency.

8. (a) Enumerate the advantages of wet sieving over dry sieving. **7**

   (b) Define the terms : sieve, screen, mesh. **7**

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