B. TECH. SEM - III (CHEMICAL ENGG.) 2014 COURSE) (CBCS) :
WINTER - 2017
SUBJECT: MECHANICAL OPERATION

Day: **Monday** Time: **10.00 AM TO 01.00 PM**
Date: **22/01/2018** Max Marks. 60

W-2017-2020

N.B.

1) All questions are **COMPULSORY**.
2) Assume suitable data **WHEREVER** necessary
3) Figures to the right indicate **FULL** marks,

Q.1 Differentiate between **(10)**

a) Open circuit grinding & closed circuit grinding

b) Crushing and grinding

c) Blake Jaw crusher and Dodge Jaw crusher

OR

Q.1 a) Calculate the operating speed of the ball mill from the following data **(06)**

i) Diameter of ball mill = 500 mm

ii) Diameter of ball = 50 mm

Operating speed of ball mill is 35% of critical speed.

b) Write a short note on Buhrstone mill. **(04)**

Q.2 a) Write a short note on characteristics of Bulk solids. **(05)**

b) Write down the industries where following conveyors are used. **(05)**

i) Screw conveyor

ii) Belt conveyor

iii) Chain & flight conveyor

iv) Bucket elevators

v) Pneumatic conveyor

OR

Q.2 Explain in detail working principle, construction, advantages, disadvantages and design calculations of screw conveyor with neat labelled diagram. **(10)**

Q.3 a) Explain the following terms in detail **(06)**

i) Mixing index

ii) Blending and Mixing

b) Explain any one mixer for dry powders. **(04)**

OR

Q.3 a) Write a short note on mixing index in blending granular solids. **(06)**

b) Write a short note on agitator selection. **(04)**

P.T.O.

Q.4 Derive the equation for determination of thickener area for continuous thickener. **(10)**

OR

Q.4 Explain in detail Kynch theory of sedimentation **(10)**

Q.5 A slurry containing 100 kg of whiting (Sp. gravity 3) per m^3 of water is filtered in a plate and frame press, which takes 900 s to dismantle, clean and assemble. If the filter cake is incompressible and has a voidage of 0.4, what is the optimum thickness of cake for a filtration pressure of 1000 kN / m^2. If the cake is washed at 500 kN/m^2 and the total volume of the wash water employed is one – quarter of that of the filtrate, how is the optimum thickness of the cake affected. Neglect resistance of filter medium and take viscosity of water as 1 m Ns/m^2. In an experiment a pressure of 165 kN/m^2 produced a flow of water if 0.02 cm^3/s through a centimeter cube of filter cake. **(10)**

OR

Q.5 The rotary drum filter 1.2 m diameter and 1.2 m long can handle 6 kg/s of slurry containing 10% solids when rotated at 0.005 Hz. By increasing the speed of 0.008 Hz it is found that it can handle 7.2 kg/s. What will be the percentage change in the amount of wash water which can be applied to each kilogram of cake caused by this increase of speed? What are the limitations to increased production by increase in the speed of rotation of the drum and what is the theoretical maximum quantity of slurry which can be handled? **(10)**

Q.6 Explain in detail with neat labelled diagram any two separators used for separating solids from fluids. **(10)**

OR

Q.6 Explain in detail **(10)**

i) Cyclone separator

ii) Electrostatic precipitator

iii) Mineral Jig