

**B. TECH. SEM - III (CHEMICAL ENGG.) 2014 COURSE) (CBCS)
: SUMMER - 2018**

SUBJECT: MECHANICAL OPERATION

Day: **Friday**
Date: **25/05/2018**

S-2018-2228

Time: **0 2.30 PM TO 05.30 PM**
Max Marks. 60

N.B.

- 1) All questions are **COMPULSORY**.
 - 2) Assume suitable data **WHEREVER** necessary
 - 3) Figures to the right indicate **FULL** marks,
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Q.1 A crushing roll 1m in diameter are set so that the crushing surfaces are 12.5 (10) mm apart and the angle of nip is 31° . What is minimum size of the particle which should be fed to the rolls? If the actual capacity is 12% of the theoretical. Calculate the through-put in kg/s when running at 2 Hz if the working face of the rolls is 0.4 m long and feed weight 2500 kg/m^3 .

OR

Q.1 A certain set of crushing rolls of 40 inch diameter and 15 inch width face are (10) set so that crushing surfaces are 0.5 inch apart. The manufacturing recommends that they are run 50 to 100 rpm. They are to crush a rock having specific gravity 2.35 and angle of nip is $31^{\circ}30'$. What are the minimum permissible sizes of feed and maximum actual capacity in tons/ hr, if the actual capacity is 12% of the theoretical?

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

OR

Q.2 a) Write a short note on Janseen's equation. (04)
b) Explain in detail Pneumatic conveyors. (06)

Q.3 a) What is the necessity of mixing and agitation in chemical industries? (04)
b) Explain any one mixer for pastes and plastic masses. (06)

OR

Q.3 a) What is the criteria for mixer effectiveness? (10)
b) What is mean by mixing index?
c) How rate of mixing is calculated?
d) Name any two mixers used for dry powders.

Q.4 Explain following terms related to sedimentation process. (10)
i) Hindered settling
ii) Terminal setting velocity
iii) Differential settling
iv) Effect of particle shape

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OR

- Q.4** a) Explain in detail batch sedimentation process with neat labeled diagram (07)
b) Explain stock's law. (03)

Q.5 Derive the equation for pressure drop through cloth and cake in filtration. (10)

OR

- Q.5** Write a short note on (10)
- i) Filter media
 - ii) Filter aid
 - iii) Selection of filtration equipment

- Q.6** Explain in detail (10)
- i) Froth flotation
 - ii) Magnetic separator

OR

- Q.6** Explain in detail (10)
- i) Electrostatic precipitators
 - ii) Cyclone separator

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