

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), Nov.-Dec. 2015

B. Tech in Chemical Engineering, 5th Semester

Roll No.....

COURSE CODE: CHE504

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Screen capacity is proportional to (where, S = screen aperture)
(a) S , (b) $1/S$, (c) S^2 , (d) S
- ii. 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
- iii. With increase in the pressure drop across the cake, the specific cake resistance for the compressible sludge
(a) increases, (b) decreases, (c) remains constant, (d) increases linearly
- iv. 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.
- v. In case of a plate and frame filter press, filtrate flow through the cake follows _____ flow.
(a) plug (b) turbulent (c) laminar (d) none of these
- vi. Which of the following is a batch sedimentation equipment?
(a) Dust catcher, (b) Filter thickener,
(c) Dry cyclone separator, (d) Rotary sprayer scrubber.
- vii. For the transportation of ultrafine particles, the equipment used is a.....conveyor.
(a) belt, (b) pneumatic, (c) screw, (d) none of these
- viii. For transporting pasty material, one will use a/an
(a) apron conveyor, (b) belt conveyor, (c) screw conveyor, (d) bucket elevator
- ix. Rittinger's number designates the new surface created per unit mechanical energy absorbed by the material being crushed. Larger value of Rittinger's number of a material indicates its
(a) easier grindability, (b) poor grindability,
(c) high power consumption in grinding (d) none of these

- x. General crushing equation is given by $d\left(\frac{P}{m}\right) = -K \frac{d\bar{D}_s}{\bar{D}_s^n}$. Bond's crushing law is obtained by solving this equation for $n =$ _____ and feed of infinite size.
 (a) 1 (b) 1.5
 (c) 2 (d) 2.5

Q.2 Short answer type questions (4 questions @ 2.5 marks) 10

- i What is compressible and incompressible cake?
- ii Define Critical speed of ball mill.
- iii Differentiate cyclones and hydro-cyclones.
- iv Differentiate Sedimentation and Thickener.

Q.3A Define the sphericity of the particle. What are the range of values for crushed particle and particle rounded by abrasion? 05

Q.3B Differentiation between the differential and cumulative method of particles size analysis. 05

Q.4A Distinguish between constant rate and constant pressure filtration. 05

Q.4B Discuss about batch sedimentation. 05

Q.5A List different types of industrial conveyers and explain any one in detail. 05

Q.5B Discuss different parameters affecting screening operation. 05

Q.6A Explain crushing and grinding principles. What is working index? 05

Q.6B State about the Rittinger's and Kick's law. 05

OR

Q.6B Write the short notes on 05

(a) Ion-Exchange process

(b) Principle of ultrafiltration with governing equation

Q.7A Explain construction and working of continuous rotary vacuum filter. 05

Q.7B Explain principles of cake filtration and pressure drop through filter cake. 05

OR

Q.7B Discuss about filter media and filter aids. 05

Q.8A A material is crushed in a Blake jaw crusher such that the average size of particle is reduced from 50 mm to 10 mm with a consumption of energy at the rate of 13 kJ/kg. What will be the consumption of energy needed to crush the same material of average size of 75 mm to an average size of 25 mm? 10

(a) Assuming Rittinger's law applies?

(b) Assuming Kick's law applies?

- Q.9A With the net sketch, discuss construction and working of cyclone separator. 10
Q.9B With the net sketch, discuss construction and working of industrial thickener. 10

OR

- Q.9B In the fluidization, different definition of average particles diameters have been used to characterized an assemblage of particles. So write down the some definition 10

- (a) Arithmetic mean diameter (b) Surface mean diameter
(c) Volume mean diameter (d) Volume-surface mean diameter

