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**Question Paper Code: 54903**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Chemical Engineering

15UCH403 - MECHANICAL OPERATIONS

(Regulation 2015)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

1. As particle size is reduced CO1- R
  - (a) screening becomes progressively more difficult
  - (b) screening becomes progressively easier
  - (c) capacity and effectiveness of the screen is increased.
  - (d) All the above
2. For crushing of solids, the Rittinger's law states that the work required for crushing is proportional to CO1- U
  - (a) the new surface created
  - (b) the size reduction ratio
  - (c) the change in volume due to crushing
  - (d) none of these
3. Screen capacity is proportional to CO2- U
  - (a) S
  - (b) 1/S
  - (c) S<sup>2</sup>
  - (d)  $\sqrt{S}$
4. Which of the following screens has the maximum capacity ? CO2- R
  - (a) Grizzlies
  - (b) Trommels
  - (c) Shaking screen
  - (d) Vibratory screen
5. Flow of filtrate through the cake in a plate and frame filter press is best described by the \_\_\_\_\_ equation CO3- R
  - (a) Kozney- Karman
  - (b) Hagen- Poiseulle's
  - (c) Fanning's
  - (d) Kremser

6. Filtrate flow rate in case of a rotary drum vacuum filter (in which  $R_m \ll R_c$ ) is proportional to \_\_\_\_\_ and the cycle time (where,  $\mu$  = filtrate viscosity  $R_m$  = filter medium resistance  $R_c$  = cake resistance ). CO3- U
- (a)  $\mu^{0.5}$  (b)  $1/\mu^{0.5}$  (c)  $1/\mu$  (d)  $1/\mu^2$
7. Weber number is significant and is concerned with the CO4- R
- (a) Solid-liquid mixing (b) Liquid-liquid mixing  
(c) Dispersion of liquid in liquid (d) Dispersion of solid in liquid
8. Power consumption during turbulent flow in agitation tank is proportional to the CO4- R  
\_\_\_\_\_ of the liquid.
- (a) viscosity (b) thermal conductivity (c) surface tension (d) density
9. Screw conveyors are CO5- R
- (a) Run at very high rpm (b) Suitable for sticky material  
(c) Suitable for highly abrasive material (d) All (a),(b) and (c)
10. A belt conveyor used for the transportation of materials can CO5- R
- (a) run upto 1 km (b) travel at a speed upto 300 metres/minute.  
(c) handle materials upto 5000 tons/hr (d) all of the above

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. Derive the equation and explain the behavior of external forces acting on the solid particles. CO1- U (8)
12. Discuss the basic principles involved in the beneficiation of ores by froth flotation. With suitable examples, explain the roll of collectors, frothing agents and modifiers in the operation. CO2- U (8)
13. Explain the construction and working of plate and frame filter press with neat sketch. CO3- U (8)
14. With a diagram, explain the working of different kneaders used for mixing of solids and pastes. CO4- U (8)
- 15 Explain the concepts involved in the operation of pneumatic conveying of solids.. CO5- U (8)

