Paper Id: | **151302** | Roll No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. TECH
(SEM-III) THEORY EXAMINATION, 2019-20
MECHANICAL OPERATION

Time: 3 Hours   *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **2 x 7 = 10**
    a) Define Ritinger's law and kick's law
    b) Define Capacity and Effectiveness of screen.
    c) Define critical speed of ball mill.
    d) Differentiate Ideal screen and actual screen.
    e) Give principle of cyclone separator.
    f) List the equipments used for transportation in industry.
    g) Define angle of nip.

SECTION-B

2. **Attempt any *three* of the following:**   **7 x 3 = 21**
    a) Explain in detail the construction and working of the Ball mill with neat figure and the industrial application.
    b) Discuss the principle and operation of cyclone separator with the help of the neat sketch. Explain cyclone separator giving its design.
    c) Discuss the settling characteristics of fine solids from liquid using batch sedimentation test.
    d) Write a short note on following: i) Silos, ii) hoppers.
    e) A leaf filter with 1 m^2 of filtering surface is operated at a constant pressure of 1 bar. The filtration equation is given by: $dt/dv = 45V + 75$ s/m^3
    Find the time required for washing the cake formed at the end of 600 minutes of filtering at the same pressure using 3000 litres of wash water.

SECTION C

3. **Attempt any *one* part of the following:**   **7 x 1 = 7**
    a) A quartz mixture having a certain screen analysis is screened through a standard 10 mesh screen. Calculate i) the mass ratio of overflow and underflow to feed ii) Effectiveness of screen. $D_p = D_{pc} = 1.651$mm, $X_f = 0.47$, $X_d = 0.85$, $X_b = 0.195$
    b) Explain in detail the construction and working of ultra-fine grinder with neat sketches.

4. **Attempt any *one* part of the following:**   **7 x 1 = 7**
    a) Explain principles of froth floatation with the detail description of froth floatation equipment.
    b) Explain the construction and working of Trommels.

5. **Attempt any *one* part of the following:**   **7 x 1 = 7**
    a) Draw neat and labeled diagram of plate and frame filter press and explain its working.
    b) Describe the construction and working principle of Magnetic separators.

6. **Attempt any *one* part of the following:**   **7 x 1 = 7**
    a) With neat diagram explain 'particulate fluidization' and 'bubbling fluidization'
    b) What are the different kinds of conveyors used in chemical industries? Discuss the working of Belt conveyors in detail

7. **Attempt any *one* part of the following:**   **7 x 1 = 7**
    a) What are the purposes of agitation? With neat diagram explain Muller mixers.
    b) Explain the method of calculating power required by an agitator for a given mixture.