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Question Paper Code: 94D05

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth Semester

Biotechnology

19UBT405- Fluid Particle Mechanics and Mechanical Operations

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. The pressure intensity at a point in a fluid is given as 3.924 N/cm^2 . Calculate the corresponding height of the fluid when the fluid is water. CO2- App
2. A fluid flows through a rotameter and it shows the reading of 6 LPM. Calculate the actual flow rate in m^3/sec . CO2- App
3. Define minimum fluidization velocity. CO2- U
4. Define fluidization. CO2- U
5. Analyze the application of knife cutters. CO3- Ana
6. State Bond's law. CO1- U
7. Sketch the model of an agitator. CO2- App
8. Sketch the flow pattern when the impeller is placed off-center of an agitator. CO2- App
9. Identify the application of filter aids. CO1- U
10. Mention 4 filter aids used in filtration. CO1- U

PART – C (5 x 16= 80 Marks)

11. (a) Discuss the physical properties of fluids and derive the expression for each property. CO2- App (16)
Or
(b) Derive the Barometric equation from hydrostatic law and elucidate the types of pressure changes that occurs in atmospheric air. CO2- App (16)

12. (a) Illustrate the mechanism of fluidization analyzing the factors and explain its types. CO2- App (16)
- Or
- (b) Illustrate the principle, working of peristaltic pump with a neat sketch and elucidate its advantages, disadvantages and application. CO2- App (16)
13. (a) Illustrate the principle, working of ultrafine grinder with a neat sketch and elucidate its advantages, disadvantages and application. CO2- App (16)
- Or
- (b) Illustrate the principle, working of hammer-mill with a neat sketch and elucidate its advantages, disadvantages and application. CO2- App (16)
14. (a) The power required by an agitator in the tank is a function of the following variables. CO4- E (16)
- Diameter of the agitator, number of rotations of the impellor per unit time, viscosity of liquid, density of liquid.
- From dimensional analysis using Buckingham's method, obtain a relation between power and the four variables.
- From dimensional analysis using Buckingham's method, obtain a relation between power and the four variables.
- From dimensional analysis using Buckingham's theorem, obtain a relation between power and the four variables.
- Or
- (b) Explain the Buckingham's theorem and derive a relation between pressure drop and four variables d (diameter of the particle), v (velocity of the particle), ρ (density of the particle), μ (viscosity of the particle) using the same. CO4- E (16)
- 15 (a) Explain the mechanism of drying using drying rate curves and design a dryer for drying of coconut for extraction of oil in industries. CO5- D (16)
- Or
- (b) Explain the mechanism of filtration and design a filtration unit for filtration of grape juices or wines in large-scale. CO5- D (16)