Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–V(NEW) EXAMINATION – SUMMER 2022**

**Subject Code:3150502 Date:09/06/2022**

**Subject Name:Mechanical Operations**

**Time:02:30 PM TO 05:00 PM Total Marks: 70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

| | | | **MARKS** |
|---|---|---|---|
| **Q.1** | **(a)** | Define (1) Screen capacity (2) Ideal screen (3) No of particles in mixture | **03** |
| | **(b)** | Define Sphericity. Prove that Sphericity of sphere is unity. | **04** |
| | **(c)** | Describe various laws for size reduction and write principle of Comminution. | **07** |
| **Q.2** | **(a)** | A certain set of rolls of 1000mm diameter by 375mm width of face. They are set so that the crushing surfaces are 12 mm apart at the narrowest point. The angle of nip is 30 °. What is the maximum permissible size of feed? | **03** |
| | **(b)** | Differentiate differential and cumulative analysis. | **04** |
| | **(c)** | A material is crushed in a jaw crusher and the average size of the particle is reduced from 5 cm to 1.3 cm with consumption of energy at the rate of 37 Watt.hr/ton. What will be the consumption of energy necessary to crush the same material of average size 8 cm to an average size 3 cm? The mechanical efficiency remains same. (a) Using Rittinger's law; (b) using Kick's law | **07** |
| | | **OR** | |
| | **(c)** | Explain the construction and working of Grizzlies with the help of a neat sketch. | **07** |
| **Q.3** | **(a)** | Explain principle of filtration. | **03** |
| | **(b)** | Derive the mathematical expression for constant rate filtration. | **04** |
| | **(c)** | Explain in detail the working of batch sedimentation with application. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Discuss Sink and float method | **03** |
| | **(b)** | Explain construction and working of the Dorr thickener. | **04** |
| | **(c)** | Explain construction and working of filter press. | **07** |
| **Q.4** | **(a)** | Write down purpose of agitation | **03** |
| | **(b)** | Define power number and write down its significance. | **04** |
| | **(c)** | Discuss scale up of agitation vessel | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Define mixing index and its significance. | **03** |
| | **(b)** | Discuss paddles agitator. | **04** |
| | **(c)** | Explain double arm kneading mixture in detail with neat sketch. | **07** |
| **Q.5** | **(a)** | Discuss the different criteria’s for selection of conveyers. | **03** |
| | **(b)** | Explain in detail the belt conveyer. | **04** |

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|---|---|---|---|
| | **(c)** | List different types of industrial conveyers and explain any one in detail. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Enlist the industrial applications of batch and continuous fluidization. | **03** |
| | **(b)** | Discuss minimum fluidization velocity and pressure drop in fluidized bed with neat sketch. | **04** |
| | **(c)** | Explain in detail: Types of fluidization. | **07** |

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