

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER- V EXAMINATION – SUMMER 2026****Subject Code:3150502****Date:09-06-2026****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.

- Q.1** (a) Define: (i) sphericity (ii) screening operation (iii) filter medium resistance **03**
 (b) Differentiate cumulative analysis and differential analysis for separation of solids by screening operation. **04**
 (c) Explain different crushing law in detail. **07**
- Q.2** (a) What is the Power number? What is its significance? **03**
 (b) A cylindrical particle of height equal to twice the diameter, calculate the value of its sphericity. **04**
 (c) What are the various parameters affecting screening operations? Explain any three of them in detail. **07**
- OR**
- Q.3** (c) Explain important characteristics, selection criteria and applications of paddles. **07**
 (a) State difference between ideal screen and actual screen. **03**
 (b) Enlist major objectives of size reduction. **04**
 (c) Explain construction and working of cyclone separator with a neat labeled diagram. **07**
- OR**
- Q.3** (a) Enlist advantages of the ball mill. **03**
 (b) Enlist major applications of fluidization. **04**
 (c) Explain construction and working of batch centrifuge with a neat labeled diagram. **07**
- Q.4** (a) Define: (i) drag coefficient (ii) bulk density (iii) filtration. **03**
 (b) Differentiate between particulate fluidization and aggregative fluidization. **04**
 (c) Define: terminal settling velocity. Calculate the settling velocity of spherical steel particles having 0.038 cm diameter, settling in an oil of specific gravity 0.82 and viscosity of 0.1poise. Consider a laminar settling zone. Density of steel particles=7.87 g/cc. **07**
- OR**
- Q.4** (a) Enlist different types of continuous filters. **03**
 (b) Explain working and advantages of a bucket elevator. **04**
 (c) With neat diagram explain principle, construction and working of a gyratory crusher. **07**
- Q.5** (a) Enlist different types of flow pattern induced in an agitated vessel. **03**
 (b) Explain working and advantages of a screw conveyor. **04**
 (c) A six blade turbine agitator of diameter 60 cm is installed centrally in tank with flat bottom of diameter 180 cm, at a height of 60 cm from the bottom. The tank is filled with a solution of viscosity of 10 cp and of 1.45 gm/ml density. The speed of agitation is 90 rpm. The tank is baffled. Calculate the power required. Data: Power number = NP = 1.05 for NRe > 300 **07**
- OR**
- Q.5** (a) Enlist names of solid mixing equipments. **03**
 (b) Discuss important characteristics of a filter medium. **04**
 (c) Draw a neat diagram and explain construction and working of a plate and frame filter press. **07**
