

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) - EXAMINATION – SUMMER 2017****Subject Code: 2143608****Date: 03/06/2017****Subject Name: Mechanical Operations in Chemical Process Industries****Time: 10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

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|------------|--|-----------|
| Q.1 | Short Questions | 14 |
| | 1 Define: Sphericity. | |
| | 2 Define: Mesh Number. | |
| | 3 Define: Angle of Nip. | |
| | 4 In Jaw crusher the fixed jaw is known as _____. | |
| | 5 Define: Size reduction. | |
| | 6 Define: Agitation | |
| | 7 List out the various mechanism for size reduction. | |
| | 8 Define: Fluidization | |
| | 9 Define: Critical Speed. | |
| | 10 Define: Filter Aids. | |
| | 11 Write the equation for the screen effectiveness. | |
| | 12 List out different types of impellers. | |
| | 13 Enlist various types of conveyors. | |
| | 14 Define: Mixing | |
| Q.2 | (a) Explain the comparison between crushing and grinding. | 03 |
| | (b) Calculate the sphericity of cylinder of diameter 1cm and height 3cm. | 04 |
| | (c) Write a short note on jaw crusher with neat diagram. | 07 |
| | OR | |
| | (c) A material is crushed in a jaw crusher and the average size of particle reduced from 5cm to 1cm, with the consumption of energy 1.32×10^4 J/kg. What will be the consumption of energy to crush the same material of an average size of 7.5cm to 2.5cm, assuming (a) Rittinger's law, and (b) Kick's law? | 07 |
| Q.3 | (a) Define screen effectiveness and also derive its equation | 03 |
| | (b) Name various laws for crushing and discuss and derive any one. | 04 |
| | (c) What is swirling and what is its effect on liquid mixing. what are the various method to prevent swirling? | 07 |
| | OR | |
| Q.3 | (a) Explain factors affecting the efficiency of screens. | 03 |
| | (b) List out different properties if filter media. | 04 |
| | (c) Write a short note on rotary drum filter with neat diagram | 07 |
| Q.4 | (a) Explain sink and float method. | 03 |
| | (b) Write a short note on cyclone separator. | 04 |
| | (c) Explain the cake, clarifying and cross flow flirtation with neat diagram. | 07 |

OR

- Q.4** (a) Write equation for Power number, Reynolds number, and Froude number for power consumption in impellers in agitation. **03**
- (b) Explain the factor affected to rate of filtration in detail. **04**
- (c) Write a short note on batch sedimentation. **07**
- Q.5** (a) Write different applications of agitation. **03**
- (b) Write a short note on belt conveyors. **04**
- (c) Define minimum fluidization velocity and explain different types of fluidization. **07**
- OR**
- Q.5** (a) Draw a neat sketch of agitated vessel and label its important parts. **03**
- (b) Discuss advantages and disadvantages of fluidization. **04**
- (c) Explain fluidization process and its application in chemical industry. **07**
