Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2150502   **Date:17/11/2016**

Subject Name:Mechanical Operation

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.**

Q.1	Answer the following questions:	**14**

1. Explain the terms 'Capacity' and 'Effectiveness' of screens
2. For separation of sugar solution from settled out mud, we use a_____ filter.
3. Give two example of Filter Aid.
4. What is the difference between a clarifier and classifier?
5. With increase in the capacity of screens, the screen effectiveness_____
6. For efficient grinding, ball mills must be operated at a speed less than the critical speed. True/False
7. State different types of filtration
8. What are the requirements for selecting a suitable filter media?
9. What is the mixing mechanism employed in a pan mixer?
10. Define: "Terminal Settling Velocity"
11. Explain work index.
12. Size reduction equipments, the maximum feed size can be accepted by which crusher?
13. For transporting pasty material, which type of conveyor is used?
14. What is the effect of cyclone diameter on separation efficiency?

Q.2	**(a)**	Critically analyze the differential and cumulative methods of analysis to determine the average particle size.	**03**
	(b)	Differentiate between open circuit and closed circuit operations.	**04**
	(c)	Classify screening equipment with the help of neat sketches. Compare between ideal and actual screens.	**07**

OR

	(c)	Classify mixers for dry powders and state their specific application.	**07**
Q.3	**(a)**	Define/explain screen effectiveness and capacity.	**03**
	(b)	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.	**04**
	(c)	Classify comminuting equipment. Explain the working principle of operation of Roll crushers with the help of a neat sketch.	**07**

Q.3 **(a)** What are filter aids and filter media? **03**

(b) Discuss differential settling method **04**

(c) Explain the process of sedimentation and derive an expression for the calculation of minimum thickener area required using Kynch theory **07**

Q.4 **(a)** Explain construction and working of the cyclone separator. **03**

(b) Calculate the sphericity of a cylinder having diameter1 cm and height 3 cm. **04**

(c) A sludge filtered in a washing plate & frame press is of such a nature that the filtration equation is $V^2 = k.\theta$, where V is the volume of the filtrate obtained in time θ, when the pressure is constant 30 cubic meter of filtrate is produced in 10 hrs.(a) 3 cubic meter of wash water is forced through the cake at the end of the filtration. What is the washing time? (b) If the filtering surface of the press is doubled, all other conditions remaining constant, how long it take to produce 30 cubic meter of filtrate? **07**

Q.4 **(a)** What are the preventive measures for reducing swirling in agitated tanks? **03**

(b) Discuss power consumption in agitated vessel with relevant equations. **04**

(c) Write short notes on the following:(1) Scale up in agitator design (2) Flow pattern in agitation vessel with turbine impeller **07**

Q.5 **(a)** What are the various equipments used for storage of solids? Discuss any one. **03**

(b) Explain any one type of mixers suitable for pastes and plastic masses **04**

(c) Explain the working of a vacuum drum filter with a neat sketch and specify the fields of application **07**

Q.5 **(a)** Write short notes on slurry transport. **03**

(b) Discuss various parameters which affect the design of Conveyors. **04**

(c) Discuss types of fluidization. Give some industrial applications of fluidization **07**

****