Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2150502 **Date:05/12/ 2015**

Subject Name: Mechanical Operation

Time:10:30am to 1:00pm **Total Marks: 70**

Instructions:

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

Q.1 (a) Define sphericity. Calculate the sphericity of cube. Explain one mixer for free flowing solids. **07**

(b) Define ideal screen, actual screen, angle of repose, angle of internal friction, work index, Screen oversize and Screen effectiveness. **07**

Q.2 (a) Write principle of comminution. Explain various laws of size reduction in detail. **07**

(b) A certain set of crushing rolls of 150 cm in diameter by 50 cm width face. They are set so that the crushing surfaces are 1.25 cm apart at the narrowest point. The manufacture recommends 100 rpm as the roll speed. They are to crush a rock having a specific gravity of 2.35 and angle of nip is 30^0. **07**

(a) What are the maximum permissible size of feed and the maximum actual capacity in metric tons per hour if the actual capacity is 12 % of the theoretical?

(b) After long use, the tires on the rolls of the mill have become roughened so that the angle of nip is $32^0.30'$. What will now be the maximum permissible size of feed and the capacity of the rolls?

OR

(b) Explain open and closed circuit operation for size reduction of solid with neat schematic diagram. **07**

Q.3 (a) Derive critical speed derivation in ball mill. A ball mill 1.2 m in diameter is being run at 48 rpm. It is found that the mill is not working satisfactorily. Would you suggest any modification in the condition of operation? **07**

(b) Give classification of size reduction equipments. **07**

OR

Q.3 (a) Explain the working of cyclone separator with neat sketch. **07**

(b) Give classification of filters. Explain centrifugal filter with sketch. **07**

Q.4 (a) A sludge filtered in a washing plate and frame press is of such a nature that the filtration equation is $V^2 = K\ t$, where V is the volume of the filtrate obtained in time t, when the pressure is constant 30 cubic meter of filtrate is produced in 10 hrs. **07**

(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?

(b) Explain sink and float method and also differential settling method. **07**

OR

Q.4 (a) Explain fluidization and condition of fluidization with neat sketch. **07**

(b) Explain pneumatic conveying system with sketch. **07**

Q.5	**(a)**	Define agitation and mixing. What are the purposes of agitation? Write different arrangement for preventing swirling?	**07**
	(b)	Explain impellers used for highly viscous liquid and use of draft tubes.	**07**

OR

Q.5	**(a)**	What is flow number? Derive the mathematical form of N_Q with all its consideration.	**07**
	(b)	Explain scale up of agitated vessel.	**07**

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