Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER III–EXAMINATION (Remedial)– WINTER 2015

Subject code: 730804 **Date: 07/12/2015**

Subject Name: Design of material handling equipments

Time: 2:30 PM to 5:00 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	**(a)**	What are the main elements of hoisting unit? Draw a neat sketch for it. Explain the hook design in detail with neat sketch.	**07**
	(b)	Explain the drum design in detail with neat sketch.	**07**
Q.2	**(a)**	Define material handling. Classify the material handling equipments in detail.	**07**
	(b)	List and discuss the factors affecting selection of material handling equipments.	**07**
		OR	
	(b)	Explain the selection of factor of safety for different material handling equipments.	**07**
Q.3	**(a)**	Discuss the load handling attachments with neat sketch stating their applications.	**07**
	(b)	The 6 X 19 wire rope is used to lift the cage of vertical mine host 350 m deep. The weight of cage is 1150kg and it has to lift 28000 kg of ore at a speed of 15 m/s which is to be attained in 10 seconds. Take D_{min} /d=75. Assume factor of safety 5 and modulus of elasticity of steel rope = 8 X 10^4 N/mm^2 Weight of rope/meter = 0.0034d^2 kg. Cross sectional area of rope = 0.38d^2 Ultimate stress for rope wire is 1800 N/mm^2 Determine diameter of rope.	**07**
		OR	
Q.3	**(a)**	Explain the steel wire rope selection with neat sketch.	**07**
	(b)	Explain the selection of motor and its rating as per BIS for material handling equipment.	**07**
Q.4	**(a)**	Discuss the design and applications of belt conveyors with neat sketch.	**07**
	(b)	Write a detailed note on screw conveyors.	**07**
		OR	
Q.4	**(a)**	An inclined belt conveyor at an angle of 15^0 to the horizontal is used in transporting a mineral ore. The capacity of the conveyor is 450 tph, at a belt speed of 2 m/sec. The mineral ore material has a density of 2000 kg/m^3. Additional data are as below: Length of load carrying run of belt = 200.5 m Drive Efficiency = 91 % width of belt = 800 mm Motor speed = 1500 RPM Factor of safety for belt = 12 Standard motor ratings : 40,50,60,75,90,100,110,125,150,175kW. ultimate tensile strength for belt per unit length (width) per ply =125 N/m mass of fabric ply belt per unit length = 12.5 kg/m effective tight side belt tension on drive pulley = 71538 N effective slack side belt tension on drive pulley = 21084 N Find (1) power required to drive the belt conveyor (2) the power rating of standard electric motor (3) the no. of plies for fabric belt	**07**

	(b)	List the application of following materials handling equipment: (i) E.O.T. Crane (ii) chain conveyor (iii) belt conveyor (iv) Jib Crane.	**07**
Q.5	**(a)**	Discuss the design of bucket elevator along with neat sketch.	**07**
	(b)	Explain the different safety devices used in various material handling equipments.	**07**

OR

Q.5	**(a)**	Explain briefly Monorail cranes with neat sketch. Derive the equation for bearing reactions and wheel load.	**07**
	(b)	Explain the design of fork and roller of a fork lift with neat sketch.	**07**

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