Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2014

Subject code: 730804 **Date: 05-06-2014**

Subject Name: Design of Material Handling Equipments

Time: 02:30 pm - 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. **Use of PSG design data book is permissible.**

Q.1	**(a)**	Explain the basic principles of selection of material handling equipment.	**07**
	(b)	Give a classification of material handling equipmentôs on the basis of load handled by them and discuss the technical parameters of the different classes.	**07**
Q.2	**(a)**	Explain take up arrangement used in belt conveyors.	**07**
	(b)	Explain the design procedure of Belt conveyor.	**07**
		OR	
	(b)	A horizontal Belt Conveyor is used for transporting limestone having mass density of 1200 kg/m^3. The surcharge factor for the belt Drive is 0.16, while the belt width is 650 mm, if the belt speed is 1.75 m/s, determine the capacity of conveyor, the effective width b(in meters),of the material carried by the belt safely is given by the equation b=0.9B-0.05.	**07**
Q.3	**(a)**	Explain the design procedure of rotary JIB crane with a rope-driven trolley.	**07**
	(b)	Determine the size of the rope and diameter of drum for an overhead traveling crane with a lifting capacity Q=20 tons operating on heavy duty. The trolley ratio is 2×3; the rope life 8 months. The 6×37 rope is cross laid with a core made of Manila hemp and impregnated with grease.ůb=180 kg/mm$^{2.}$	**07**
		OR	
Q.3	**(a)**	Why lifting magnets are used in material handling equipmentôs? Explain electric lifting magnet with neat sketch.	**07**
	(b)	Select by calculation the ropes, pulley and drum Required for an electric overhead travelling crane with a lifting magnet. Lifting capacity Q=5000 kg. Lifting height H=8m, medium service duty, weight of the lifting magnet G=2000 kg, number of rope parts Z=4, weight of lifting tackle Go=120 kg.	**07**
Q.4	**(a)**	Explain monorail cranes with neat sketch and derive equation for bearing reaction, wheel load and resistance to motion.	**07**
	(b)	Derive the equation for speed at which the load is lifted for hand power hoisting mechanism.	**07**
		OR	
Q.4	**(a)**	Determine the braking torque for hoisting and traveling mechanisms of an electric overhead travelling crane. Given: Lifting Capacity Q=5000 kg, Span L_{cr} =14m, Load Lifting (or lowering) speed V_{load}=10m/min, trolley traverse speed V_{trol}=45m/min, Crane travelling speed Vcr =100m/min, Power supply-three Phase, 380 V, duty-medium (DF=25%).	**07**
	(b)	Explain the general characteristics of hoisting machines and list out the specifications of hoisting machines.	**07**

Q.5	**(a)**	Explain the design procedure of bucket elevator.	**07**
	(b)	What is The difference between the ñspaceò buckets and ñcontinuousò bucket arrangement in bucket elevators.	**07**

OR

Q.5	**(a)**	Differentiate between a conveyor and an elevator.	**07**
	(b)	Checking a forged single hook for load lifting capacity of crane G=5 tons, Weight of the Hook with grabbing tons Go =1 tons.	**07**

****