Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– III • EXAMINATION – SUMMER 2015

Subject Code: 730904 **Date: 02/05/2015**

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)** Classify the material handling equipment in detail. **07**

(b) Determine the resistance offered by a single carrying and return idler for the conveyor having the flowing data: **07**

Capacity of the conveyor = 400 t/hr
Belt speed = 2 m/s
Mass of belt = 16 Kg/m
Mass of each idler = 25.1 Kg
Carrying side pitch = 1 m
Return Side pitch = 2 m
Coefficient of friction between idler and the pulley = 0.02
Coefficient of friction between roller pin and idler = 0.04
Ratio of Roller pin diameter to idler tube diameter = 0.5
Belt Inclination = 15 degree.

Q.2 **(a)** What are the requirements of the belt used in a conveyer system? Explain. **07**

(b) An inclined belt conveyor is used for transporting ash over a distance of 1.2km and height of 500m. The material density for ash can be taken as $0.5 t/m^3$ Assume the belt speed to be 1.5m/s and belt width to be 400mm. Determine the capacity of the conveyor. For the belt use the following data for the flowability factor. **07**

Conveyor Inclination	flowability factor, C1
10º-15º	2.65×10^{-4}
16º-20º	2.50×10^{-4}
21º-25º	2.35×10^{-4}
26º-30º	2.20×10^{-4}
31º-35º	2.05×10^{-4}

The effective width b (in meters), of the material carried by the safely is given by the question. b = 0.9B-0.05
Where B = Belt width, m

OR

	(b)	Determine the braking torques for hoisting and travelling mechanisms of an electric overhead crane. Lifting capacity = 5000 Kg Span = 14 m Load lifting speed = 10 m / min Trolley traverse speed = 45 m/min Crane travelling speed = 100 m /min Duty-medium (DF = 25 Percent) Speed of breaking Shaft = 965 rpm Efficiency of hoisting Mechanism =0.8 Moment of gyration (GD^2) = 1.96 kg- m^2 Coefficient accounting for the effect of the mass of transmission mechanism parts ŭ = 1.15 Braking Coefficient ϭ = 2	**07**
Q.3	**(a)**	How does the Design of Sheave and Pulley differ? Explain with sketch.	**07**
	(b)	Explain the design procedure of rotary jib crane with a rope driven pulley.	**07**
		OR	
Q.3	**(a)**	How does the flexibility of a wire influence its design? How the flexibility of wire can be increased?	**07**
	(b)	List the application of following crane: (i) Gantry Crane (ii) Cantilever crane (iii) Monorail Crane (iv) Jib Crane	**07**
Q.4	**(a)**	Explain the general characteristics of hoisting machine and list the specification of hoisting machine.	**07**
	(b)	Explain the design of travelling wheel for steel rails.	**07**
		OR	
Q.4	**(a)**	Suggest Suitable material for crane hook & justify them. Why trapezoidal cross- section is preferred for the hook?	**07**
Q.4	**(b)**	Design a cogwheel drive for the slewing mechanism of a crawler tractor. Diameter of cogwheel D= 260 cm; Transmitted torque M = 160000 Kg-cm. Tooth face width factor ϭ = 2.5 and consider L = 13 cm.	**07**
Q.5	**(a)**	Discuss the design procedure for bucket elevator.	**07**
	(b)	What is Fatigue life of a rope? How does u design a rope for fatigue action?	**07**
		OR	
Q.5	**(a)**	Explain the Safety Devices of Elevators.	**07**
	(b)	What are the factors that must be considered for selection of material handling equipment? Also differentiate between unit load and bulk load.	**07**

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