Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013

Subject code: 730904 **Date: 15-05-2013**

Subject Name: Design of Material Handling Equipments

Time: 10.30 am – 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 **(a)** Coal India company requires to convey the coal from a Coal mine to a Thermal Power plant located at 80 kms away from coal mine. **07**

Thermal Power plant requires the coal at the rate of 50 TPH and Coal India company extracts the coal at the rate of 70 TPH.

Design a Bulk Material Handling System with an approximate layout showing all the important equipment's in appropriate order from coal mine to the place in Thermal power plant where the coal is actually consumed.

(b) "Belt Conveyor is used for conveying wide range of materials, Steep angle conveying and has adaptability to the path of travel." Justify the statement. **07**

Q.2 **(a)** Explain the criterions to be considered for selection Material Handling Equipment's in Bulk Material Handling system. **07**

(b) State and explain the different types of magnetic separator used in Belt Conveyor. **07**

OR

(b) What is the function of feeder on belt conveyor? Explain with the help of neat sketch Belt feeder and Apron feeder stating their field of application. **07**

Q.3 **(a)** Explain the following equipment's associated with Bulk material Handling System: **07**

1) Stacker Reclaimer

2) Belt Weigher

(b) I) A horizontal Belt conveyor is used for transporting a material having mass density of 800 kg/m^3.Surcharge factor for the belt drive is 0.09. Determine belt width, if material is to be conveyed at the rate of 36 ton/hour. Assume belt velocity as 1.75 m/s. **04**

II) Determine the belt capacity of flat horizontal belt, if effective belt width of material on belt is "b", belt velocity "v" and surcharge angle 15 degree. **03**

OR

Q.3 **(a)** Explain the Shrink wrap unitizing and explain its advantages. **07**

(b) I) Explain the design consideration for receiving the material in material handling system. **03**

II) Explain the usefulness of Garland idlers along with its field of application. **04**

Q.4 **(a)** Explain the stretch wrap unitizing stating its advantages and compare the shrink and stretch wrapping unitizing process. **07**

(b) Explain the different types of yard storage methods for bulk materials. **07**

OR

Q.4 **(a)** Design the shaft for the conveyor drive pulley having 800 mm of diameter and 1600 mm face width. Assume the following data: **07**

Tight side tension = 10840 kg
Slack side tension = 3925 kg
Resultant load with 210 degree wrap and horizontal.
Bearing center to center distance = 200 cm
Distance between diaphragm and bearing center = 33.25 cm
Yield stress for shaft material = 275 Mpa
Ultimate tensile stress = 560 Mpa
Modulus of elasticity = 2.1×10^6 kg/cm^2
Motor rpm = 1500
Gear ratio = 18
Motor power = 350 kw
Rubber lagging thickness = 12 mm
Shaft length at coupling = 21.5 cm

(b) Explain the functions performed by the cover and carcass of the conveyor belt. **07**

Q.5 **(a)** Explain the following with respect to conveyor sortation system: **07**

1) Deflectors
2) Pushers
3) Pullers

(b) What are the different types of sensor used in Material Handling System? Explain any one of the sensor in the light of its working principle and area of application. **07**

OR

Q.5 **(a)** Belt ability to accommodate material is governed by the surcharge angle instead of repose angle. Justify the statement. **07**

(b) I) What do you mean by conveyor sortation system? What are the design considerations for sortation system? **03**

II) A block and tackle, having two sheaves at the top block and two at the hook, with the rope anchored at the top block, is with a manila rope. Suggest the suitable diameter of rope if load to be raised is 400 kg. Also calculate the efficiency of the hoist. Assume factor of safety as 30.Assume C=1.14. **04**

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