## **GUJARAT TECHNOLOGICAL UNIVERSITY** M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 730904Date: 26/12/2012Subject Name: Design of Material Handling EquipmentsTime: 10.30 am - 01.00 pmTotal Marks: 70Instructions:1. Attempt all questions.2. Make suitable assumptions wherever necessary.3. Figures to the right indicate full marks.			
Q.1	(a)	Draw a coal handling plant layout for a power station in India, showing the	07
	(b)	flow of materials and important component/equipment. Discuss the need of Material Handling Equipments in detail.	07
Q.2	(a)	Differentiate between hoisting and conveying equipments. Discuss the criterion for selection of material handling equipment for a particular application	07
	(b)	With the help of neat sketch, explain the plow discharge and traveling tripper.	07
	(b)	Explain the function of the Take up pulley, belt weigher, wagon tippler and magnetic separator with the help of neat sketches.	07
Q.3	(a) (b)	Discuss the belt selection procedure for belt conveyor in detail. Design a carne hook for a 3 ton crane. The hook is to be of swiveling type and of a) Triangular section & b) Circular section.	07 07
Q.3	(a)	Find out the self aligning force on belt by single roller return idler for following application data. Belt width B = 1.2 m Belt mass $M_b = 20$ kg/m Roller rotating mass Mr=24 kg Idler pitch Pr = 3 m Conveying resistance coefficient portion arising from roller rotation & contact between belt & roller f <sub>1</sub> =0.016 $\theta_i$ =15° $\mu_0$ =0.35 D=0.05 m	07
	(b)	Radial arm length to guide roller periphery, R=0.6962 Explain skim coated plies, breaker plies, traverse cord protection and molded edge construction with respect to its characteristics features and its application.	07

- Q.4 (a) What are the major loads acting on a conveyor drive pulley? What are the 07 major design criterion for pulley shell, diaphragm, hub, shaft and bearing?
  - (b) A block and tackle has six sheaves on each block and is reefed with 2.5 cm 07 diameter manila rope for which the working load is given as  $p=30d^2$  kg. Determine the capacity of the block and tackle and its efficiency.

Q.4 (a) Suggest a suitable size of 6 X 19 SWR to be used with a drum hoist to lift a 07

load of 8000 kg from a depth of 120 meter. There is a starting slack of 3 meters. Assume that the weight per meter length of rope may be taken as  $0.35d^2$  kg where d is the diameter of the rope in cm.

- **Q.4** (b) Explain the procedure to design a bucket elevator.
- Q.5 (a) What are the basic steps to be taken into account into while designing a 07 package like corrugated shipping container, folding box etc.
  - (b) Explain some of the means of storing bulk materials along with its typical **07** application and also mention the equipments useful for storing and retrieving bulk materials.

## OR

Q.5 (a) 1) A flat horizontal belt conveyor is used for transporting crushed rock 04 having mass density of 2 t/m<sup>3</sup>. The belt is 800 mm wide and has a speed of 1.75 m/s. Determine volume and mass capacity of the conveyor. The surcharge angle is 25°.

2) A horizontal belt conveyor is used for transporting a material having mass density of 800 kg/  $m^3$  Surcharge factor for the flat drive is 0.08. **03** Determine belt width, if material is to be conveyed at the rate of 36 t/hr and belt speed of 1.75 m/s.

(b) Calculate drop energy at the time of lump impact onto a belt for the 07 following application at junction of two belt conveyor. Incoming belt conveyor level = 6.0 mIncoming belt conveyor velocity = 3 m/sMaterial first impact by direct fall on stone box (horizontal Shelf) at 3.8 m Material second impact on chute inclined wall by direct fall of 2.1 m Material is sliding down in 55° incline last leg of chute from level 2.1 to 1.0 m Outgoing belt conveyor level = 1 mOutgoing belt conveyor velocity = 3 m/sLump size corner to corner = 450 mmLump shape =a \*1.25a \*2aLump density =  $1250 \text{kg/m}^3$ Consider both conveyor as horizontal, 67% loss of kinetic energy during impact on horizontal shelf and 50 % loss of kinetic energy during impact on inclined wall. The coefficient of friction between material and steel chute is 0.6 and lump is sliding.

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