



B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Sixth Semester

MECHATRONICS ENGINEERING

U18MCE0011: Design of Material Handling Systems

(Use of approved design data book is permitted)

(Assumption and assumed data have to be stated clearly)

COURSE OUTCOMES

- CO1:** Recognize the need and types of the material handling equipments.
CO2: Calculate the power requirements for a given belt conveyor.
CO3: Select the components for the belt conveyors.
CO4: Select and design the conveyors for the particular application.
CO5: Differentiate the conveyors and elevators and design the bucket and cage elevators.
CO6: Explain the various elements of the hoists.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

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|---|-----------------------|
| 1. List the factors of insufficient material handling. | CO1 [K ₂] |
| 2. List the various types of equipment that are used to transport the material inside the industry. | CO1 [K ₂] |
| 3. How to calculate the power required to run a belt conveyor. | CO2 [K ₃] |
| 4. How do you calculate the weight of the material per meter length? | CO2 [K ₃] |
| 5. What is the purpose of take up pulley in the belt conveyor? | CO3 [K ₂] |
| 6. Brief the purpose of safety devices used in belt conveyor. | CO3 [K ₂] |
| 7. Select and brief the suitable conveyor to feed a coal. | CO4 [K ₃] |
| 8. List the types of loading and unloading method used in bucked conveyor. | CO5 [K ₂] |
| 9. Mention the purpose of using arresting gears in a hoist. | CO6 [K ₂] |
| 10. Draw the components of wire rope. | CO6 [K ₂] |

**Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)**

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|-----|--|----|-----|-------------------|
| 11. | In a mining, the horizontal belt conveyor used to convey the capacity of 150TPH ungraded coal with 125mm lump size. The distance between head to tail pulley is 150m, use three roller with troughing angle 25°. Determine the power required to run the belt conveyor. | 16 | CO2 | [K ₃] |
| 12. | Discuss the types of bulk material and material handling equipment used to transport the materials in an industry. | 16 | CO1 | [K ₂] |
| 13. | Explain the components in belt conveyor with suitable sketch and give suitable Applications. | 16 | CO3 | [K ₂] |
| 14. | a) A horizontal screw conveyor used to convey the pesticides whose specific weight 1150kg/m ³ . Conveying rate 1000kg/hr and length of the conveyor 10m. Weight of the screw is 15kgf/m speed of the screw is 30rpm, truff efficiency is 30% ratio between screw pitch and dia is 0.7, coefficient of friction is 0.4. Determine main dimensions and capacity of drive motor and axial thrust on thrust on screw. | 10 | CO4 | [K ₃] |
| | b) Illustrate the apron conveyor and list its advantages. | 06 | CO4 | [K ₂] |
| 15. | a) Design a bucket elevator used for conveying cement whose bulk density is 0.85 tones/cu.m has a lift of 14m. Capacity of elevator is 80TPH. | 10 | CO5 | [K ₃] |
| | b) Illustrate the cage elevator and brief the safety devices used in cage elevator. | 06 | CO5 | [K ₂] |
| 16. | a) In an industrial crane wire rope used to lift 32kN of total load about 70m height. The speed of hoist is 2.75m/s and full speed is reduced in 12sec. design suitable wire for the mentioned above application. | 12 | CO6 | [K ₃] |
| | b) List the different types of grabbing attachment used in hoist. | 04 | CO6 | [K ₂] |
