M.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Third Semester

CAD / CAM

P07CCE11 Design of Material Handling Equipments

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. Classify material handling equipments
2. What are the main technical parameters of surface and overhead transporting facilities?
3. Write are the parameters to be considered for the selection of rope?
4. Give the principal advantages of electric lifting magnets.
5. State the main elements of traveling mechanism of a crane pulley.
6. What is cogwheel drive?
7. What is Vibratory conveyor?
8. Write briefly on the necessity of counter weights in elevator.
9. Sketch the double rope grab bucket
10. Write briefly about safety devices in elevator.

PART B (5 x 16 = 80 Marks)

11. a) A hoist of capacity 3 tonnes is to be designed for a sugar production plant .The lifting height is to be 6 meters and its speed is 0.5 m/sec. The hoist is to work for 10 hours per day at rate of 8 cycles per hour. Determine
    (i). Size of 6x19 rope required
    (ii). Life of the selected rope
    (iii). Dimensions of drum and pulley

(OR)

  b). Design a Ramshorn hook to carry a load of 15 tons.

12.a)   Determine the braking toque for hoisting and traveling mechanisms of an electric overhead Crane for the following data:
       Lifting Capacity Q = 6000 kg, Span Lcr = 14 m, load lifting speed = 10 /min, Trolley traverse speed = 45 m/min, Crane traveling speed = 90m/min, power supply – three phase (Medium duty – DF = 25%).

(OR)

  b) Design a Double shoe holding brake for the hoisting mechanism for a 5 – ton traveling crane with a lifting speed of 25 m/min. The crane operates on heavy duty,
    and   200 braking operations per hour may be assumed. Efficiency of the hoisting   mechanism may be taken as 95%. Motor speed is 600 rpm.

   (i) Check the life of the brake lining, dispreading electric braking also check for heating.

   (ii) Select a suitable braking magnet and spring.

   (iii)Determine the transmission ratio of the brake levers.

13.a) Design the longitudinal drive for an electric overhead traveling crane assuming the weight of the trolley including the hoist as 4 tons and that of the crane structure as 5 tons. The crane should have a speed of 1 m/sec. Calculate the wheel diameter, gear reductions and capacity of motor. Check for cycle overloading of the motor due to dynamic loading.

(OR)

b) Design a suitable cogwheel drive for the swing mechanism of a traveler tractor with following specifications:
Diameter of cogwheel is 2.5 m, torque- transmitted 15000 N-m. Determine peripheral force, diameter of the pin based on wear factor, tooth pitch, number of pin and actual diameter of the cogwheel.

14.a) A continuous toughed belt conveyor is to be designed for carrying stone out of quarry to the crusher with a rise of 10 m over the first 150 m and a rise of 30 m over the next 80 m. Quantity to be conveyed is 1500 tons/hr. Belt speed is 80 m/min. Design suitable belting, idlers, pulleys and drive motor. Sketch the scheme of the conveyor.

(OR)

b) Explain with neat sketch the working principles of Apron Conveyor.

15.a) A bucket elevator is to lift bulk material at a rate of $10 m^3$/hr. through a vertical height of 5 m. The bulk density of the lumped material is $1200 kg/m^3$.

(i) Design the elevator using a belt drive specifies the buckets, pulleys and the motor.
(ii) Sketch the elevator scheme and the feeding and discharge arrangement.

(OR)

b) Write brief notes on the following:
(i) Rail Traveling mechanism.
(ii) Vibratory conveyors
(iii)Lift
(iv)Brake used in crane

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