BE Mechanical (EVENING) 5TH Yr, 2ND , Semester Examination- 2019
SUBJECT: Material Handling

Time: 3 hours **Full Marks: 100**

Assume any data only if needed
Answer any FIVE questions

1. (a) What are the principle of Material Handling System? Discuss in detail. [12]

(b)How bulk load and unit load are characterized? What is static and dynamic angle of repose? [4+4]

2. (a) A Screw conveyor is to be designed to convey moulding sand at an inclination of 15^0 with the horizontal. The required capacity is 50 tones per hour, length of conveying is 25 mtr, bulk density of sand 1.60 ton/cubic mtr and is abrasive in nature, loading efficiency is 0.125, screw pitch =1.0D (where D= nominal diameter of screw), r.p.m of the screw is 50 r.p.m, inclination factor is 0.55, mass flow rate is 50 tones/hr, progress resistance coefficient is 4. Find out
(i) nominal diameter of screw in meter.
(ii) total power of screw required in Kw. [10]

(b)Explain the typical applications of screw conveyor. Sketch different profiles used in screw conveyor. State the restrictions in screw conveyor system. [4+4+2]

3. (a)The power required at the driving pulley just for driving the belt is 120 kw. The tension in the slack side is 50 N and μ =0.4, α =150 degrees. Calculate the belt speed in mm/sec. [6]

(b) Find out the width of the belt of a horizontal 3- roller troughed belt conveyor designed to convey 150 T/hr of foundry sand for sand plant at a speed of 2.0 m/sec. The side idlers are set at angles of 15^0. Given that:
(i) Bulk weight of material is 0.6 tons/m^3.
(ii) Static angle of repose of the load is 40^0.
[10]

(c) In a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts. [4]

4. (a)Draw neatly the feeding and discharging arrangement of a Directed gravity discharge type of bucket elevator. Label the diagram. [10]

(b). A bucket elevator is to be designed to handle aluminium ore of 100 tons per hour. The height of elevator is 20m. Calculate the individual capacity of bucket in litres on the basis of the following data: [10]
i) bucket filling factor =0.75
ii) material bulk density =1300 kgf/m^3.
iii)elevator speed =0.83 m/sec
iv)bucket spacing =0.320m

5. (a) Explain difference between unpowered and powered roller conveyor [4]

(b) Explain total resistance to motion take place in case of unpowered roller conveyor. [10]

(c) Draw velocity time diagram in case of unpowered roller when a moving load comes over a static roller. [6]

6. (a) What is the full form of E.O.T crane? What are the advantages and limitations of it? How this crane is specified? Give a neat sketch of an E.O.T crane. [1+3+3+5]

(b)Draw neat sketches of different types of jib cranes used in different applications. [8]

7(a) What is pneumatic conveyor? Discuss the advantages and disadvantages of pneumatic conveyor? [8]

(b) How pneumatic conveyor system can be classified? Draw a schematic diagram of any one system. [12]

8. (a)Discuss advantages and disadvantages of hydraulic method of handling of materials. [14]

(b) What are the difference between hydraulic conveyor and pneumatic conveyor? [6]