

**B.E. MECHANICAL ENGINEERING FOURTH YEAR SECOND SEMESTER  
SUPPLEMENTARY EXAM – 2024**

**SUBJECT: MATERIAL HANDLING**

**Time: 3 hours**

**Full Marks: 100**

**Assume any data only if needed**

***Answer any FIVE Questions***

- Q1.** (a) Write down any five principles of Material Handling System. Discuss in detail.  
(b) In a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts.  
(c) Discuss the advantages and disadvantages of hydraulic conveyor? [10+5+5]
- Q2.** (a) Write at least four points on advantage and disadvantages associated with Unitization of load.  
(b) What is the difference between unit load and bulk load? What is static and dynamic angle of repose?  
(c) What are the basic objectives of Material handling system? [4+ (4+4) +8]
- Q3.** (a) A horizontal belt conveyor with 3-roller troughing arrangement handles coal at the rate of 150 ton/hr at a speed of 2.5 m/sec. the side troughing idlers are set at an angle of  $15^\circ$  with respect to the axis of central idler. If the bulk weight of the material is  $0.8 \text{ ton/m}^3$  and static angle of repose of the load is  $45^\circ$ , then find out the width of the belt. Deduce the expression that you use in solving the problem with necessary assumptions .  
(b) In a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts. [12 + 8]
- Q4.** (a) Explain total resistance to motion take place in case of unpowered roller conveyor.  
(b) Discuss the advantages and disadvantages of pneumatic conveyor? [12+8]
- Q5.** A Screw conveyor is to be designed to convey moulding sand at an inclination of  $15^\circ$  with the horizontal. The required capacity is 50 tones per hour, length of conveying is 25 mtr, bulk density of sand  $1.50 \text{ ton/cubic mtr}$  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 60 tones/hr, progress resistance coefficient is 4. Find out  
(i) nominal diameter of screw in meter.  
(ii) total power of screw required in Kw. [20]
- Q6.** (a) Explain briefly the various parts of hoisting equipment.  
(b) How hoists and winches are specified?  
(c) What are the major advantages of overhead travelling crane? [10+ 6+4]
- Q7.** Write short note on any **two** of the following: [2 X 10]  
(a) Velocity Time diagram of unpowered roller conveyor  
(b) Industrial applications of powered and unpowered roller conveyor  
(c) Apron conveyor system  
(d) Screw conveyor