

**B.E. MECHANICAL ENGINEERING FOURTH YEAR SECOND SEMESTER
SUPPLEMENTARY EXAM-2023
MATERIAL HANDLING**

Time: 3 Hours

Full Marks: 100

Assume any relevant data, if necessary. Symbols in the Question Paper carry their usual meanings. Figures in the margin indicate full marks. All Parts of any one question must be answered together.

Answer any TEN (10) Questions

- 10×10=100
- Q1.** (a) What are the basic objectives of materials handling systems?
(b) Discuss advantages and disadvantages of unitization of load. 5+5=10
- Q2.** Write down any five principles of Material Handling System. Discuss in detail. 10
- Q3.** (a) In a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts.
(b) Discuss the advantages and disadvantages of hydraulic conveyor? 5+5=10
- Q4.** Find out the width of the belt of a horizontal 3- roller troughed belt conveyor designed to convey 150 Tonnes/hr of foundry sand for sand plant at a speed of 2.5 m/sec. The side idlers are set at angles of 20°. Given the following data:
(i) Bulk weight of material is 0.8 tons/m³.
(ii) Static angle of repose of the load is 45°. 10
- Q5.** (a) A Screw conveyor is to be designed to convey moulding sand at an inclination of 15° with the horizontal. The required capacity is 50 tones per hour, length of conveying is 25 mtr, bulk density of sand 1.50 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. 10
- Q6.** (a) Explain total resistance to motion take place in case of unpowered roller conveyor. 10
- Q7.** (a) Explain with neat sketches, any two types of buckets used in bucket elevators and state their uses.
(b) A bucket elevator is to be designed to handle aluminium ore of 100 tons per hour. The height of elevator is 20 m. Calculate the individual capacity of bucket in litres on the basis of the following data:
(i) bucket filling factor =0.75
(ii) material bulk density =1300 kgf/m³.
(iii) elevator speed =0.83 m/sec
(iv) bucket spacing=0.320 m. 4+6=10

[Turn over

- Q8.** How pneumatic conveyor system can be classified on the basis of air pressure? Briefly describe the basic principles of operation of a positive pressure system of low pressure pneumatic conveying. If necessary, give figures to enumerate this. 5+5=10
- Q9.** (a) How industrial trucks are classified? Explain different parts of fork lift trucks with sketch. Briefly explain the use of fork lift trucks.
(b) The rated capacity of a FLT is 2000 kg and load centre is 450 mm. The distance between front wheels to heel of the fork is 350 mm. If a load is to be carried whose c.g. is at a distance of 550 mm from the heel of the forks, then calculate the maximum safe weight “W” that can be carried. 4+6=10
- Q10.** Explain briefly the various parts of hoisting equipment. 10
- Q11.** (a) How hoists and winches are specified?
(b) What are the major advantages of overhead travelling crane? 6+4=10
- Q12.** (a) What is luffing? What are the different mechanisms used to impart luffing motion in cranes?
(b) Classify cranes. (2+3)+5=10
