

(Hours 3)

[Total Marks: 80]

- N.B.
- 1) Question No. 1 is compulsory
  - 2) Solve Any Three from remaining Five questions.
  - 3) Use of standard data book like PSG, Mahadevan and Kale Khandare is permitted
  - 4) Assume suitable data if necessary, giving justification

Q1 Answer any **Four** from the following

- a) Give the basic constructional details of different types ropes used in EOT crane. And what do you understand by  $6 \times 37$  rope? **5**
- b) Explain Methodology for mechanical system design with suitable example? **5**
- c) State the significance of specific speed and NPSH in the design of a centrifugal pump? **5**
- d) Explain why an I – section with  $I_{xx} \leq 4 I_{yy}$  is selected for connecting rods of an I.C. Engine? **5**
- e) Why cleaning of belt is necessary for belt conveyor? List down the usual types of cleaners. **5**

Q.2 The following specification refers to an EOT crane. **20**

Application - Class II

load to be lifted - 80 KN

Hoisting Speed - 6 m/min

Maximum lift – 10 m

- a. Select a standard hook, material and design stresses induced at the most critical section.
- b. Select suitable type and size of the wire rope for an expected life of 12 months.
- c. Design the pulley axle and select suitable bearing.
- d. Design the rope drum.

Q.3 A centrifugal pump directly coupled to a motor is required to deliver 1000LPM of water at  $30^{\circ}\text{C}$  against a total head of 25 m. **20**

- a. Select the type of motor speed and determine the power.
- b. Determine the impeller diameter, inlet and outlet vane angles and no. of vanes.
- c. Design the impeller shaft.
- d. Design the shape of the volute casing.
- e. Decide diameters of the suction and delivery pipes.

**TURN OVER**

- Q.4. Design the complete  $20^\circ$  troughing belt conveyer including drive for the following **20**  
Specification.  
Material to be conveyed = Coal.  
Maximum lump size = 100 mm.  
Capacity = 250 TPH.  
Inclination =  $12^\circ$ .  
Center to centre distance = 100 m.
- Q.5. a) For the design of a 2 X 3 machine tool gear box with following specification. **15**  
 $N_{\min} = 100\text{rpm}$ ,  $N_{\text{motor}} = 960\text{ rpm}$ , GP ratio = 1.26  
i. Draw structural diagrams,  
ii. Draw ray diagram and speed chart,
- Q5. b) Distinguish between gear pump and the centrifugal pump. **5**
- Q.6. a) A four stroke single cylinder water cooled Diesel engine develops 7.5 KW brake power **15**  
when operating at 1000rpm.  
a) Determine the size of engine ( bore and stroke)  
b) Design wet liner and cylinder.  
c) Design piston with pin and piston rings
- Q.6. b) Explain arithmetic progression law of stepped regulation in multispeed gear box? **5**