

(3 Hours)

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

Q 1 Answer any **Four** from the following

- a) What is bend in rope pulley system of hoisting mechanism? State the effect of bend on the rope life. **5**
- b) Explain the optimum design concept in system design. **5**
- c) Why cavitation occurs in a centrifugal pump? State the remedial measures for the same. **5**
- d) List the different types of piston rings and their functions. **5**
- e) Why geometric progression is preferred for the speed selection in the multi speed gear box design? **5**
- Q 2 a) Explain the rope construction in hoisting rope with example. **5**
 b) Select a suitable hook with trapezoidal cross section and check it at most critical cross section for design hoisting load of 50 kN. Also select the suitable thrust bearing for it. **15**
- Q 3 a) State the fanning effect in the belt conveyor system. **5**
 b) Determine the width of the conveyor belt and motor capacity for the following **15**
 specification
 Material to be conveyed : Coal
 Capacity : 150 TPH
 Inclination : 10 degree
 Centre to Centre distance : 60 m
- Q 4 a) Explain the ovality of the piston with neat sketch. **5**
 b) Determine bore diameter and design a piston for a 4-stroke, single cylinder, water cooled, vertical diesel engine with following specifications: **15**
 Indicated power = 20 kW
 Speed = 1200 rpm
 Compression Ratio = 14
- Q 5 a) Describe the working of the gear pump with neat sketch. **5**
 b) Design a volute casing for a centrifugal pump having impeller with outer diameter 320 mm and inner diameter 160 mm. The specifications for the pump are **15**
 Total manometric head: 20 m
 Discharge: 900 LPM
 Motor speed : 1440 rpm
- Q 6 a) A six speed gear box is to be designed for a machine tool with geometric progression ratio as 1.41 and $N_{\max} = 1440$ rpm **20**
 i. Draw and Select suitable structural diagram.
 ii. Draw a ray diagram and speed chart
 iii. Determine the number of teeth on each gear
 iv. Draw the deviation diagram