

(3 Hours)

[Total Marks 80]

N.B. 1) Question No. 1 is compulsory2) 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
- What is a bend in a rope pulley hoisting system? How does it affect rope life? **5**
 - Illustrate the design morphology process using a flowchart and relevant examples. **5**
 - Why does cavitation occur in a centrifugal pump? Suggest suitable remedial measures. **5**
 - What is piston ovality? Explain with the help of a neat diagram. **5**
 - Derive the expression for hydraulic force developed in a gear pump. **5**
- Q 2 (a) Select a suitable 6×37 wire rope for a 150kN hoisting load and estimate its service life. **10**
- (b) Select a suitable hook with trapezoidal cross section and check it at most critical cross section for design hoisting load of 50kN. Also select the suitable thrust bearing for it. **10**
- Q 3 (a) Briefly explain belt construction and materials used. **5**
- (b) Determine the width of the conveyor belt and motor capacity for the following specification **15**
- | | |
|---------------------------|-------------|
| Material to be conveyed | : Gravel |
| Capacity | : 100 TPH |
| Inclination | : 10 degree |
| Centre to Centre distance | : 50 m |
- Q 4 (a) What is the most cost-effective cross-section for a connecting rod, and why? **5**
- (b) Determine bore diameter and design a piston for a 4-stroke, single cylinder, water cooled, vertical petrol engine with following specifications: **15**
- Indicated power = 15 kW
Speed = 1200 rpm
Compression Ratio = 8
- Q 5 (a) Write short notes on various pressure angle systems used in gear design. **5**
- (b) Given the following specifications of a centrifugal pump,
- Total manometric head: 20 m,
 - Discharge: 900 LPM,
 - Motor speed : 1440 rpm,
- Required motor power **5**
 - Inlet and exit diameter of an impeller **5**
 - Number of impeller blades if inlet and exit angles are 20 and 25 degree respectively. **5**
- Q.6 A spur gear box is required to transmit 12 KW power from an electric motor rated at 1440 rpm with reduction ratio of 4.
- Design a gear pair by selecting suitable material and design stresses. **10**
 - Check the gear for dynamic load and contact stresses. **10**
