Q.P.Code:13206

(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

Q1 Answer any **Four** from the following

a) Explain lays in wire rope with construction of wire rope? **5**
b) Explain why piston skirt is made oval in shape? **5**
c) Explain basic considerations in design of multi-speed gear box? **5**
d) Explain use of snub pulley in belt conveyor system? **5**
e) List and explain parameters affecting volumetric efficiency in gear pump? **5**

Q2 The following data refers to centrifugal pump for pumping water. **20**
Static suction head= 5 m
Length of suction pipe= 10 m
Static delivery head = 20 m
Delivery pipe length= 30 m
Discharge = 1500 LPM
Perform complete design of pump showing suitable layout.

Q3 The following specification refers to an EOT crane. **20**
Application - Class II
load to be lifted - 100 KN
Hoisting Speed - 8 m/min
Maximum lift – 15 m
1. Select suitable type and size of the wire rope for an expected life of 13 months.
2. Design the pulley axle and select suitable bearing.
3. Select a standard hook, suitable material and find the stresses induced at the most critical section.
4. Design the cross piece and shackle plate.

Q4 a) Design the gear pump to deliver 90 LPM of SAE 30 oil at a pressure of 70 bar. Design should include. **15**

1. Gear, drive shaft, casing and bolt.
2. Select suitable motor for gear pump.

Q4 b) Explain the importance of the design process with the help of real life problem? **05**

Q5 a) The following data are pertaining to a 4 stroke single cylinder, water cooled petrol engine. **15**

Brake power= 50 KW
Mass of reciprocating parts = 8 kg.
Length of connecting rod = 310 mm.
Stroke length = 150mm.
Speed = 3000 RPM.
Compression ratio = 5:1
Over speed= 10%

Design the following 1) Piston and piston pin 2) connecting rod for forged steel having "I" cross section with proportion being depth = 6t and width = 4t ,where "t" is thickness of web and flange

Q5 b) Explain arithmetic progression law of stepped regulation in multispeed gear box? **05**

Q6 A 20° troughing belt conveyer has following specifications, **20**

Material to be conveyed = limestone. Maximum lump size = 150 mm.
Capacity = 310 TPH. Inclination = 15°. Center Distance = 50 m.

1. Determine the width, number of plies and thickness of the belt.
2. Select a proper motor for conveyer.
3. Design the drive pulley along with its shaft.
4. Design the troughing idler for the belt.
