

Time: 3 Hours**Marks: 80**

- Question No. 1 is compulsory.
- Attempt any three questions from the remaining.
- Assumption made should be clearly stated.
- Design Data Book by PSG, Mahadevan , Kale & Khandare are permitted to use.

Q.1 Answer any four**20**

- Draw flow chart for design methodology and explain with example.
- State the importance of multispeed gear box.
- Write the different types of piston rings and its function.
- How to select the types of blade for centrifugal pump. Number of blades depends on which parameters.
- What are the advantages of multifall system in hoisting mechanism?

Q.2 (a) What is importance of bend in rope design also state function of compensating pulley? 5

- (b) For the specification of an EOT Crane , **15**

Application - Class II
Load to be Lifted - 100 KN
Hoisting speed - 10m/min
Maximum Lift - 8m

- Select suitable hook and check at critical cross section.
- Design cross piece based on bending criteria.
- Design shackle plate.

- Q.3** (a) Write advantages and disadvantages of Belt conveyor system. 5
- (b) The specification of belt conveyor system are, 15
- | | |
|---------------------------|--------------|
| Capacity | : 300TPH |
| Material to be conveyed | : Lime Stone |
| Inclination | : 12 degree |
| Lump size | : 80mm |
| Centre to Centre distance | : 50m |
- (Assume troughing angle 25 degree)
- Design conveyor belt.
 - Find motor capacity.
- Q.4** (a) What are different types of stresses induced in liner? State the requirements of liner material. 5
- (b) Design following components of single cylinder, four stroke, water cooled Petrol Engine to develop 40KW at a speed of 2500rpm by making suitable assumption and neat sketches. Assume Compression Ratio as 7.5 15
- Cylinder, 2. Liner, 3. Cylinder Head, 4. Stud.
- Q.5** (a) What is water hammer in case of centrifugal pump, how to avoid it. 5
- Q.5** (b) The specifications for the Gear Pump are, 15
- Discharge- 40 LPM, Pressure- 50 bar
- By making suitable assumption,
- Select suitable standard Motor.
 - Design gear and check for bending failure, dynamic load and pitting
 - Find the resultant force acting on the heavily loaded shaft..

- Q.6** (a) What are the different laws can be used to decide the rpm value of different steps in machine tool gear box. Explain any one law with example. 5
- (b) A 9 speed Machine Tool Gear Box is to be designed, for following Specification: 15
- Minimum speed $N_{\min} = 100$ rpm, $N_{\max} = 630$ rpm, Progression ratio $\Phi = 1.26$
- Draw structural diagrams and select the best one.
 - Draw ray diagram and speed chart for selected structural formula.
 - Determine the number of teeth on each gear.