



**CHHATRAPATI SHIVAJI MAHARAJ INSTITUTE OF TECHNOLOGY**

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Affiliated to the Mumbai University, Approved By AICTE - New Dehli.

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**SAMPLE UNUNIVERSITY QUESTION PAPER**

Time: 3 Hours

Marks: 80

- Question 1 is compulsory.
- Attempt any three questions from remaining.
- Design data book PSG, Mahadevan, Kale and Khandare are permitted to use.

**Q1. Answer any four from the following.**

- a) What do you mean by morphology of mechanical design? Explain any three phases of it. 5
- b) What are the different types of piston rings? Explain the function of them. 5
- c) Why cleaning of belt is necessary in belt conveyor? list down different types of cleaners. 5
- d) Draw a neat sketch of centrifugal pump and explain its principle of working? 5
- e) State the assumptions made in Lewis's bending strength equation and its significance. 5

**Q2.** A single stage helical gear box is used to transmit 12.5 kw power at 1440 rpm of pinion. The desire transmission ratio is 5:1. Assume 20-degree FD tooth profile and material C50 for pinion and gear.

- a) Determine the module. 5
- b) Check gear for dynamic load. 5
- c) Check gear for contact stresses. 5
- d) Determine the gear teeth proportions and write constructional details. 5

**Q3.** The following specification refers to an EOT crane. (20 Marks)

Application - Class II  
load to be lifted - 100 KN  
Hoisting Speed - 10 m/min  
Maximum lift - 5 m

- a) Design 6\*37 type of rope and find its life. 5
- b) Select a standard hook, material and design stresses induced at the most critical section. 5
- c) Select suitable motor for hoisting. 5
- d) Design the rope drum. 5

Q4 a) Define Lead, Lead Angle, Normal pitch and Helix angle with respect to the worm gearing. 5



- Q 4 b) The specification of belt conveyer system are  
 Capacity = 300 TPH,  
 Material to be conveyed = Lime stone,  
 Maximum lump size = 80 mm,  
 Inclination = 12°,  
 Center to Center distance = 50 m,  
 Troughing angle 25°,  
 I. Design conveyer belt. 10  
 II. Find motor capacity 5
- Q5.a) A centrifugal pump directly coupled to a motor is required to deliver 1000 LPM of water at 30 degree C against a total head of 25 m.  
 I. Select the suitable type of motor power and speed. 5  
 II. Determine the impeller diameter, inlet and outlet vane angles and no. of vanes. 5
- Q5. b) A Gear pump required to deliver 25 LPM of SAE20 oil at a pressure of 25 bar. Efficiency of the gear pump is 80 %.  
 I. Select suitable standard motor. 5  
 II. Design gear and check for bending failure. 5
- Q6. a) Explain why an I – section with  $I_{xx} \leq 4 I_{yy}$  is selected for connecting rods of an I.C. Engine? 5
- Q6. b) A four-stroke single cylinder water cooled Diesel engine develops 7.5 KW brake power when operating at 1000rpm.  
 I. Determine the bore and stroke of a cylinder. 5  
 II. Design wet liner. 5  
 III. Design piston with pin and piston rings. 5

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(Time: 3 Hours)

[Total Marks: 80]

- N.B.:** 1. Q.1 is compulsory. Attempt any three questions out of the remaining.  
2. Figures to the right indicate full marks.  
3. Assume suitable data wherever required.

- Q.1** 20
- a Differentiate between: Standard & Special Equipment.
  - b Discuss the advantages & disadvantages offered by Doka shuttering system.
  - c Draw a neat sketch/flowchart showing the various components of a Hydro power plant.
  - d Describe the various Civil engg applications of LIDAR technique.
- Q.2**
- a Discuss the various factors to be considered while selecting construction equipment. 08
  - b Mention the various applications of Air compressor in Construction industry. 06
  - c Enlist the various stone crushing equipment and explain the working of cone crusher. 06
- Q.3**
- a With the help of schematic sketch, explain the working of Vertical shaft sinking machine 10
  - b Describe Cut and Cover method of tunneling and discuss its suitability. 10
- Q.4**
- a Draw a neat labelled sketch of a Tower crane. State the benefits that they offer for high rise construction. 10
  - b Discuss any two methods of controlled demolition of buildings. 10
- Q.5**
- a Explain incremental launching method of bridge construction. 08
  - b Describe the various types of construction involved in setting up a fuel station. 06
  - c List the equipments required for construction of an Airport with the purpose they serve. 06
- Q.6**
- a Describe the EM and ED systems of Maglev. 08
  - b Discuss the advantages & disadvantages of Prefab housing system. 08
  - c What are the applications of BIM in Metro construction project? 04

