12/11/2024 MECHANICAL / SEM-VII DMS QP CODE : 10066630

(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)	Explain system concepts in design with suitable examples.	**5**
b)	Explain different types of gear tooth failures.	**5**
c)	Explain different types of take-up arrangement in belt conveyor.	**5**
d)	Draw a neat sketch of centrifugal pump and explain its Working Principle.	**5**
e)	Explain why an I – section with Ixx ≤ 4 Iyy is selected for connecting rods of an I.C. Engine?	**5**

Q 2 A two-stage gear box is used to transmit 10 KW power from an electric motor running at 1440 rpm to a machine with overall reduction ratio of 20. For the second stage spur gear pair, **20**
1) Determine the module using bending failure.
2) Check the gear for dynamic load by using Buckingham's method.
3) Check the gears for wear strength.
4) Work out constructional details of gears.

Q 3 (a) The following specifications refer to an EOT crane. **20**
Load to be lifted: 200 KN.
Hoisting speed: 12 m/min.
Application: Class-II.
1) Select suitable wire rope, find its diameter and check it for expected life.
2) Select standard hook and check the induced stress only at 45° inclined plane
3) Design the pulley axle and select suitable bearing.
4) Design the cross piece, side plate and shackle plate.

Q 4 (a) Explain how assumptions made in Lewis equation are taken in account during design? **5**

(b) The Specification of belt conveyer system are, **15**
Capacity = 250 TPH.
Material to be conveyed = Lime stone.
Maximum lump size = 70 mm.
Inclination = 12°.
Center to Center distance = 60 m. (Assume troughing angle 25°)
1) Design conveyor belt.
2) Find motor capacity.

Q 5 (a) A centrifugal pump is to be designed for following specifications: **10**

Static suction head = 4m
Length of suction pipe =11m
Static delivery head =19m
Length of delivery pipe = 40m
Discharge =2500 LPM
Fluid to be lifted = water at room temperature.

1) Design impeller.
2) Design impeller shaft.

(b) It is required to design the gear pump for flow 70 LPM and pressure 50 bar. **10**

1) Select suitable motor power, determine gear module & check it for bending.
2) Design the driver gear shaft.

Q.6 A four-stroke single cylinder water cooled Diesel engine develops 10KW brake power when operating at 1000rpm. **20**

1) Determine the size of engine (bore and stroke)
2) Design wet liner and cylinder.
3) Design piston with pin and piston rings
4) Design the connecting rods
