R20 Regulation *Subject code: 3P6CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Supplementary Examinations, February 2024

DESIGN OF MACHINE MEMBERS – II

(Mechanical Engineering)

Maximum Marks: 70 Date:15.02.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

	All the following questions carry equal marks (10X2M=20 Marks)	CO	Bloom Tx
1	Why are ball bearings preferred to journal bearings for a shaft mounted on a gear box?	CO1	L1
2	Explain Bearing characteristic number for journal bearings	CO1	L2
3	What are the different types of stresses induced in the connecting rod?	CO2	L1
4	What are the advantages of aluminum piston?	CO2	L1
5	How do you specify a Leaf Spring?	CO3	L1
6	List the classification of springs?	CO3	L1
7	What is meant by creep of a belt and what is its effect?	CO4	L1
8	What are the advantages of chain drives over belt drives?	CO4	L1
9	State the assumptions made in Lewis equation.	CO5	L2
10	Define the terms: i) pressure angle and ii) circular pitch.	CO5	L1

Part-B

	Answer All the following questions. (5X10M=50Marks)		
11	A shaft rotating at 1440 rpm is supported by two bearings. The forces acting on each bearing are 6000N radial load and 3500 N axial thrust. If the shaft diameter is 40mm and the expected life of the bearing is 500h, select a suitable bearing if the required reliability of the bearing is to be 99percent. [10]	CO1	L4
	OR		
12	Following data is given for a 3600 N hydrodynamic bearing. Journal diameter=100mm, bearing length=100mm, radial load=50kN, journal speed=1440 rpm, radial clearance=0.12 mm, viscosity of lubricant =16 Cp. Calculate: i) Minimum oil film thickness, ii) Coefficient of friction and iii) Power lost in friction. [10]	CO1	L3
13	Design a connecting rod of I cross section for an automobile diesel engine of the following specifications. Diameter of cylinder=100mm, Stroke length =125mm, Maximum combustion pressure =2.8MPa, Maximum engine speed=2000rpm, Weight of the	CO2	L5

reciprocating parts =1.1kg, Length of connecting rod between centers=31.5cm, Assume an allowable crushing stress =3000kg/cm^2. [10]

OR

14	Design an aluminum alloy piston for a single acting four stroke engine for the following Specifications: Cylinder bore =0.30 m, Stroke=0.375 m, Maximum gas pressure =8 N/mm^2 Brake mean effective pressure=1.15 MPa, Fuel consumption= 0.22 kg/KW/hr Speed=500 rev/min. [10]	CO2	L5
15	A. What are the principal characteristics of different types of springs? [4] B. A truck spring has 12 number of leaves, two of which are full length leaves. The spring supports are 1.05 m apart and the central band is 85 mm wide. The central load is to be 5.4 KN with a permissible stress of 280 MPa. Determine the thickness and width of the steel spring leaves. The ratio of the total depth to the width of the spring is 3. Also determine the deflection of the spring. [6]	CO3	L4

OR

16	Design a compression helical spring to carry a load of 500 N with a deflection of 25 mm. The spring index may be taken as 8. Assume the following values of the spring material: Permissible shear stress=350 Mpa Modulus of rigidity =84 KN/mm^2, Wahl's factor =(4C-1)/(4C-4) +0.615/C, where C is spring index. [10]	CO3	L5
17	A V-belt is required for a 15 kW, 1440 rpm electric motor, which drives a centrifugal pump running at 360 rpm, for a service of 24 hrs per day. From space considerations, the center distance should be approximately 1 m, Determine: i) belt specifications, ii) number of belts, iii) correct center distance, and iv) pulley diameters. [10]	CO4	L6

OR

18	A. Where are the V-belts used? Mention the advantages of V-belts over flat belts. [3] B. A pulley is driven by a flat belt running at a speed of 600 m/min. The coefficient of friction between the pulley and the belt is 0.3 and the angle of lap is 160°. If the maximum tension in the belt is 700 N; find the power transmitted by a belt. [7]	CO4	L4
19	A. Write the design procedure for spur gear drives. [5] B. Explain the following terms used in helical gears : (i) Helix angle; (ii) normal pitch; and (iii) axial pitch. [5]	CO5	L3

OR

20	A parallel helical gear 300 mm in diameter has 200 involute full depth teeth and helix angle is 30^0 . It transmits a torque of 4500 N-m. Find the tangential, radial and axial loads acting on the teeth. Indicate them graphically. [10]	CO5	L4