R18 Regulation *Subject code: 2P6CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, July 2024

DESIGN OF MACHINE MEMBERS II

(ME)

Maximum Marks: 70 Date:22.07.2024 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	What is meant by hydrodynamic lubrication?	1	L1
2	State any four desirable properties of a good bearing material.	1	L1
3	Define rating life of bearing.	2	L1
4	Why ball and roller bearings are called 'antifriction' bearings?	2	L1
5	Explain the various stresses induced in the connecting rod	3	L1
6	At what angle of the crank the twisting moment is maximum in the crank shaft? Explain	3	L1
7	What is helical torsion spring? How does it differ from helical compression spring?	4	L1
8	On what factors does the power transmitted by a belts depends?	4	L1
9	State applications of gear drives.	5	L1
10	Write a shot note on scoring?	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	Explain about the Hydro dynamic bearing and journal bearing with neat sketch. [10]	1	L2
	OR		
12	Design a journal bearing for a centrifugal pump with the following data: Diameter of the journal = 150mm Load on bearing = 40KN Speed of journal = 900rpm. [10]	1	L2
13	A 306 radial ball bearing with inner ring rotation as 8s work cycle as follows Radial force 3KN , Axial load 2KN Speed 1200rp Under steady load conditions the basic dynamic load capacity of the bearing is 24.25KN. Determine the expected average life of this bearing. Take X=0.56 and Y=1.43 [10]	2	L2
	OR		
14	Design a self-aligning ball bearings for a radial load of 7000 N and a thrust	2	L2

	load of 2100 N. the desired of the bearing is 160 millions of revolutions at 300r.p.m. Assume uniform and steady load. [10]		
15	The specifications of high speed petrol engine connecting rod are given as below: Piston diameter = 100mm Stroke length = 125mm Length of the connecting rod=300mm Rated rpm of the engine =1500 Compression ratio = 6:1 Mass of reciprocating parts per cylinder = 2.25kg Speed = 1500rpm Maximum explosion pressure = 3.5Mpa Bearing pressure for big end = 7MPa Bearing pressure for small end = 14MPa Factor of safety=7 Density= 8000kg/m3 Yield strength in compression 330Mpa. Connecting rod should be of I-section and be made of forged steel, the proportions being depth h=5t, width =4t, where is the flange and web thickness. Determine Dimensions of the crank pin & piston pin . [10]	3	L2
	OR		
16	Explain about the open flat belt drive and V-belt drive. [10]	3	L2
17	A helical tension spring is used in the spring balance to measure the weights. One end of the spring is attached to the rigid support while the other end, which is free, carries the weights to be measured. The maximum weight attached to the spring balance is 1500 N and the length of the scale should be approximately 100 mm. The spring index can be taken as 6. The spring is made of oil-hardened and tempered steel wire with ultimate tensile strength of 1360 N/mm2 and modulus of rigidity of 81 370 N/mm2. The permissible shear stress in the spring wire should be taken as 50% of the ultimate tensile strength. Design the spring and calculate (i) wire diameter; (ii) mean coil diameter; (iii) number of active coils; (iv) required spring rate; and (v) actual spring rate. [10]	4	L2
	OR		
18	A cast iron pulley transmits 20 kW at 300 r.p.m. The diameter of pulley is 550 mm and has four straight arms of elliptical cross-section in which the major axis is twice the minor axis. Find the dimensions of the arm if the allowable bending stress is 15 MPa. Mention the plane in which the major axis of the arm should lie. [10]	4	L2
19	Explain about spur gear and helical gear with nomenclature. [10]	5	L2
	OR		
20	A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3 mm. Calculate (i) the transverse module; (ii) the transverse pressure angle; (iii) the axial pitch; (iv) the pitch circle diameters of the pinion and the gear; (v) the centre distance; and (vi) the addendum and dedendum circle diameters of the pinion. [10]	5	L2