R18 Regulation *Subject code:2P6CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, November 2025

DESIGN OF MACHINE MEMBERS II

(ME)

Maximum Marks: 70 Date: 21.11.2025 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.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

DATA BOOK ALLOWED

	Part-A			
All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Define Basic dynamic load rating in rolling contact bearings	2M	1	L1
2	Write some guide lines for selecting a proper type of bearing	2M	1	L1
3	What are the methods and materials used in the manufacture of crankshafts?	2M	2	L1
4	Where do you use self-aligning ball bearings and spherical roller bearings	2M	2	L1
5	What are the methods and materials used in the manufacture of crankshafts?	2M	3	L1
6	What are the forces that act on the piston head of an internal combustion engine	2M	3	L1
7	write design procedure for spur gears	2M	4	L1
8	Write equation for formative number of teeth in helical gears?	2M	4	L1
9	Write a short notes on design of springs	2M	5	L1
10	What are the different of springs	2M	5	L1
	Part-B			
Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	A 150mm diameter shaft supporting a load of 10KN has a speed of 1500rpm.The shaft run in whose bearing length is 1.5 times the shaft diameter. If the diametric clearance of bearing is 0.15mm and the absolute viscosity of the oil at the operating temperature is 0.011 Kg/m-s. Find the power wasted in friction.	10M	1	L2
	OR			
12	What is the purpose of bearings in machinery world. Give the classification in detail and their applications.	10M	1	L2
13	Select a single row deep groove ball bearing for a radial load of 4000 N and an axial load of 5000 N, operating at a speed of 1600 r.p.m. for an average life of 5 years at 10 hours per day. Assume uniform and steady load	10M	2	L2
	OR			
14	The rolling contact ball bearing are to be selected to support the overhung countershaft. The shaft speed is 720 r.p.m. The bearings are to have 99% reliability corresponding to a life of 24 000 hours. The bearing is subjected to an equivalent radial load of 1 kN. Consider life adjustment factors for	10M	2	L2

	operating condition and material as 0.9 and 0.85 respectively. Find the basic dynamic load rating of the bearing from manufacturer's catalogue, specified at 90% reliability.			
15	Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore = 100 mm ; Stroke = 125 mm ; Maximum gas pressure = 5 N/mm2 ; Indicated mean effective pressure = 0.75 N/mm2 ; Mechanical efficiency = 80% ; Fuel consumption = 0.15 kg per brake power per hour ; Higher calorific value of fuel = 42 × 103 kJ/kg ; Speed = 2000 r.p.m. Any other data required for the design may be assumed.	10M	3	L2
	OR			
16	A four stroke diesel engine has the following specifications : Brake power = 5 kW ; Speed = 1200 r.p.m. ; Indicated mean effective pressure=0.35N/ mm2;Mechanical efficiency = 80 %. Determine : 1. bore and length of the cylinder ; 2. thickness of the cylinder head ; and 3. size of studs for the cylinder head.	10M	3	L2
17	Design a belt drive pulley for transmitting 15kW at 280 rpm. The velocity of the belt is not to exceed 10m/s, and the maximum tension is not to exceed 15N/mm width. The tension on the slack is one half of that on the tight side. Determine: a.Width of the pulley b.Diameter of the pulley.	10M	4	L2
	OR			
18	Design a leaf spring for the following specifications: Total load = 140 kN; Number of springs supporting the load = 4; Maximum number of leaves = 10; Span of the spring = 1000 mm; Permissible deflection = 80 mm. Take Young's modulus, E = 200 kN/mm2 and allowable stress in spring material as 600 MPa.	10M	4	L2
19	A pair of helical gears are to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 10 000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given (σ) es = 618 MPa	10M	5	L2
	OR			
20	The following particulars of a single reduction spur gear are given, Gear ratio=10:1; Distance between centers =660mm approximately; pinion transmits 500kw at 1800rpm; Involutes teeth of standard proportions (addendum=1m) with pressure angle of 22.50; Permissible normal pressure between teeth =175N per mm of width. Find: i. The nearest standard module if no interference is to occur. ii. The number of teeth on wheel; iii. The necessary width of pinion. iv. The load on the bearings of the wheels due to power transmitted.	10M	5	L2