R18 Regulation *Subject code:2P6CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, April 2026

DESIGN OF MACHINE MEMBERS-II

(ME)

Maximum Marks: 70 Date: 16.04.2026 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.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	List types of antifriction bearings.	2M	1	L1
2	Define Basic static load rating in rolling contact bearings.	2M	1	L1
3	At what angle of the crank the twisting moment is maximum in the crank shaft?	2M	2	L1
4	What are the materials used in the manufacture of piston?	2M	2	L1
5	List the advantages of the chain drive over belt and rope drive.	2M	3	L1
6	What are the disadvantages of V-belt drive over flat belt drive?	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 about 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 full journal bearing of 50mm diameter and 100mm long has a bearing pressure of 1.4N/mm2• The speed of the journal is 900rpm and the ratio of journal diameter to the diametric clearance is 1000. The bearing is lubricated with oil, whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 kg/m-s. The room temperature is 350C.Find, (1)The amount of artificial cooling required. (2)The mass of lubricating oilrequired, if the difference between the outlet and inlet temperature of the oilis 10°C. Take specific heat of oil as 1850J/Kg/0C.	10M	1	L2
	OR			
12	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
13	A shaft rotating at constant speed is subjected to variable load. The bearings supporting the shaft are subjected to stationary equivalent radial load of 3 kN for 10 per cent of time,2 kN for 20 per cent of time, 1 kN for 30 per cent of time and no load for remaining time of cycle. Ifthe total life expected for the bearing is 20 × 106 revolutions at 95 per cent reliability, calculate dynamic load rating of the ball bearing.	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 operating condition and material as 0.9 and 0.85	10M	2	L2

	respectively. Find the basic dynamic load rating of the bearing from manufacturer's catalogue, specified at 90% reliability.			
15	Design a connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of 3.15 N/mm^2. The diameter of the piston is 100 mm ; mass of the reciprocating parts per cylinder 2.25 kg; length of connecting rod 380 mm; stroke of piston 190 mm and compression ratio 6 : 1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as 10 N/mm^2 and 15 N/mm^2. The density of material of the rod may be taken as 8000 kg/m^3 and the allowable stress in the bolts as 60 N/mm^2 and in cap as 80 N/mm2. The rod is to be of I-section for which you can choose your own proportions. Draw a neat dimensioned sketch showing provision for lubrication. Use Rankine formula for which the numerator constant may be taken as 320 N/mm^2 and the denominator constant.	10M	3	L2
	OR			
16	A four stroke diesel engine has the following specifications : Brake power=5kW; Speed=1200r.p.m.; Indicated mean effective pressure=0.35N/ mm^2; 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 reciprocating compressor is to be connected to an electric motor with the help of spur gears. The distance between the shafts is to be 500 mm. The speed of the electric motor is 900 r.p.m. and the speed of the compressor shaft is desired to be 200 r.p.m. The torque, to be transmitted is 5000 N-m. Taking starting torque as 25% more than the normal torque, determine: 1. Module and face width of the gears using 20 degrees stub teeth, and 2. Number of teeth and pitch circle diameter of each gear. Assume suitable values of velocity factor and Lewis factor.	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