Regulation R17 *Subject code: 1P6CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Year II Semester Supplementary Examinations, February 2024

DESIGN OF MACHINE MEMBERS-II

(MECHANICAL ENGINEERING)

Maximum Marks: 70 Date:17.02.2024 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.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Design data book is allowed for examination

Part-A

All the following questions carry equal marks (10X2M=20 Marks)

Q.NO	QUESTIONS		CO	Blooms Tx
1	What is meant by hydrodynamic lubrication?	2	1	Remembering
2	Write the wedge film and squeeze film journal bearings	2	1	Understanding
3	Write the design of piston for an internal combustion engine.	2	2	understanding
4	Write a short note on piston rings.	2	2	Remembering
5	Write about the various types of belt drives with neat sketches?	2	3	Remembering
6	On what factors does the power transmitted by a belts depends?	2	3	Remembering
7	Write the design procedure of spur gears?	2	5	Remembering
8	Derive Lewis equation for beam strength of gear tooth on spur gears.	2	5	understanding
9	Write a short notes on design of springs?	2	4	understanding
10	Write the classification of springs?	2	4	Evaluate

Part-B

Answer All the following questions. (10M X 5=50Marks)

11	A journal bearing 60 mm is diameter and 90 mm long runs at 450 r.p.m. The oil used for hydrodynamic lubrication has absolute viscosity of 0.06 kg/m-s. if the diametral clearance is 0.1 mm, find the safe load on the bearing.	10	1	Analyze
	OR			

12	A full journal bearing of 50mm diameter & 100mm long has a bearing pressure of 1.4N/mm2. The speed of the journal is 900rpm & the ratio of journal diameter to the diametral clearance is 1000. The bearings is lubricated with oil whose absolute viscosity at the operating temperature of 75^0c may be taken as 0.11kg/m-s. The room temperature 35^0c. find the amount of artificial cooling required.	10	1	Analyze
13	Design a self-aligning ball bearings for a radial load of 7000 N and a thrust load of 2100 N. the desired of the bearing is 160 millions of revolutions at 300r.p.m. Assume uniform and steady load.	10	2	application
	OR			
14	The rolling contact ball bearings are to be selected to support the overhung countershaft. The shaft speed is 720r.p.m. The bearings are to have 99% reliability corresponding to a life of 24000 hours. The bearing is subjected to an equivalent radial load of 1kN. Consider life adjustment factors for operating condition and material as 0.9 and 0.85 respectively. Find the basic dynamic load rating of the bearing from manufacture's catalogue, specified at 90% reliability.	10	2	application
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/mm2. The diameter of the piston is 100 mm; mass of the reciprocating parts per cylinder 2.25kg; 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 10N/mm2 and 15 N/mm2. The density of material of the rod may be taken as 8000kg/m3 and the allowable stress in the bolts as 60 N/mm2 and in cap as 80 N/mm2. The rod is to be of I-section for which you can choose your own proportions.. Use Rankine formula for which the numerator constant may be taken as 320 N/mm2 and the denominator 1/7500.	10		Apply
	OR			
16	Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore = 100mm; Stroke = 125mm; Maximum gas pressure = 5N/mm2; Indicated mean effective pressure = 0.75 N/mm2; Mechanical efficiency = 80%; Fuel consumption =0.15kg per brake power per hour; Higher calorific value of fuel =42 x 103 kJ/kg; Speed = 2000r.p.m. Any other data required for the design may be assumed.	10	3	Analyze

17	Design a leaf spring for the following specifications Total load = 140 kN, number of springs supporting the load = 4, maximum numbers of leaves = 10, span of the spring = 1000 mm, permissible deflection = 80 mm,. Take young's modulus, E = 200 KN/ mm^2, and allowable stress in spring material as 600 MPa.	10	4	Apply
	OR			
18	A belt, 100 x 10mm is transmitting power at 15m/s. the angle of contact on the driver (smaller) pulley is 1560, if the permissible stress for the belt material is 2N/mm2; determine the power that can be transmitted at this speed. Tale the density of leather as 1000kg/m3 and coefficient of friction as 0.25. Calculate the maximum power that can be transmitted.	10	4	Apply
19	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	10	5	Understand
	OR			
20	A pair of helical gears is to transmit 15KW. The teeth are 200 stub in diametric plane and have a helix angle of 450. The pinion runs at 10,000rpm and has 8mm pitch diameter. The gear has 320mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100Mpa. Determine a suitable module and face width from static strength considerations.	10	5	application