R20 Regulation *Subject code:3P5CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, December 2024

Design Of Machine Members – I

(ME)

Maximum Marks: 70 Date:28.12.2024 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	Define Machine Design	1	L1
2	What is stress concentration?	1	L1
3	What are the types of joints in welding?	2	L1
4	What is reversed stress? Draw a stress–time curve for reversed stress.	2	L1
5	What is a tap bolt?	3	L1
6	What is transverse fillet weld?	3	L1
7	What is a cap screw?	4	L1
8	What is a knuckle joint?	4	L1
9	What is coupling? Where do you use it?	5	L1
10	Describe Rigid Flange Couplings	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	What are the steps involved in machine design. [10M]	1	L2
	OR		
12	The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to 1. Maximum principal stress theory; 2. Maximum shear stress theory. Take permissible tensile stress at elastic limit = 100 MPa and Poisson's ratio = 0.3. [10M]	1	L2
13	A machine component is subjected to a flexural stress which fluctuates between + 300 MN/m2 and – 150 MN/m2. Determine the value of minimum ultimate strength according to 1. Gerber relation; 2. Modified Goodman relation; and 3. Soderberg relation. Take yield strength = 0.55 Ultimate strength; Endurance strength = 0.5 Ultimate strength; and factor of safety = 2. [10M]	2	L2
	OR		
14	Explain the significance of Goodman's line and Soderberg line in design of members subjected to reversal of stresses? [10M]	2	L2

15	Explain the various ways in which a riveted joint may fail. [10M]	3	L2
	OR		
16	Find the efficiency of the riveted joint Single riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 50 mm. Assume Permissible tensile stress in plate = 120 MPa Permissible shearing stress in rivets = 90 MPa Permissible crushing stress in rivets = 180 MPa.[10M]	3	L2
17	A 45 mm diameter shaft is made of steel with a yield strength of 400 MPa. A parallel key of size 14 mm wide and 9 mm thick made of steel with a yield strength of 340 MPa is to be used. Find the required length of key, if the shaft is loaded to transmit the maximum permissible torque. Use maximum shear stress theory and assume a factor of safety of 2. [10M]	4	L2
	OR		
18	Design a sleeve and cotter joint to resist a tensile load of 60 kN. All parts of the joint are made of the same material with the following allowable stresses : σt = 60 MPa ; τ = 70 MPa ; and σc = 125 MPa [10M]	4	L2
19	A solid shaft is transmitting 1 MW at 240 r.p.m. Determine the diameter of the shaft if the maximum torque transmitted exceeds the mean torque by 20%. Take the maximum allowable shear stress as 60 MPa [10M]	5	L2
	OR		
20	Design and make a neat dimensioned sketch of a muff coupling which is used to connect two steel shafts transmitting 40 kW at 350 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 15 MPa. [10M]	5	L2