Q.P. Code: 16ME314 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations November

DESIGN OF MACHINE ELEMENTS-I

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	**a**	How do you classify the machine design? Explain.	**7M**
	b	Write the bending stress relation and draw the diagram.	**5M**
		OR	
2	**a**	Explain the general design procedure while designing a machine element.	**6M**
	b	Draw the stress –strain diagram for mild steel. Explain.	**6M**
		UNIT-II	
3	**a**	A machine component is subjected to a fluctuating stress that varies from 40 N/mm^2 to 100 N/mm^2. The corrected endurance limit of the machine component is 270 N/mm^2. The ultimate stress and yield point stress of the material are 600 and 400 N/mm^2 respectively. Find the factor of safety using: (i) Gerber formula. (ii) Solderberg line. (iii) Goodman line.	**7M**
	b	Define fatigue stress and variable fatigue stress.	**5M**
		OR	
4	**a**	Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete reversal), σ_e=265 MPa and tensile yield strength of 350 MPa. The member is subjected to a varying axial load from W_{min} =-300 KN to W_{max} = 700 KN and has a stress concentration factor is 1.8. Use factor of safety as 2.	**8M**
	b	Define Notch sensitivity and endurance limit.	**4M**
		UNIT-III	
5	**a**	Write advantages and disadvantages of welded joint over riveted joints.	**6M**
	b	What are the assumptions made in the design of welded joint?	**6M**
		OR	
6	**a**	A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 kN. Find the length of weld if the permissible shear stress in the weld does not exceed 55 MPa.	**7M**
	b	What are the different types of failure of riveted joints?	**5M**
		UNIT-IV	
7	**a**	Draw neat sketch of knuckle joint and its application.	**8M**
	b	Define torsional rigidity and lateral rigidity	**4M**
		OR	
8	**a**	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.	**8M**
	b	What type of stresses is induced in shafts?	**4M**

UNIT-V

9	**a**	Draw neat sketch of sunk and saddle key and its application.	**6M**
	b	Draw neat sketch of bushed pin type flange coupling and its application.	**6M**

OR

12M

10 Design and draw a cast iron flange coupling for a mild steel shaft transmitting90 kW at 250 r.p.m. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1° in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa.

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