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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations August-2021

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**	What is meant by factor of safety? Explain how it can be used in design applications	**6M**
	b	How do you classify materials for engineering use?	**6M**

OR

2	**a**	How do you classify the machine design? Explain.	**6M**
	b	Derive an expression for the impact stress induced due to a falling load.	**6M**

UNIT-II

3		Explain stress concentration in detail and various methods to reduce stress concentration in machine member.	**12M**

OR

4		A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20 kN and a maximum value of 50 kN. Determine the diameter of bar by taking a factor of safety of 1.5, size effect of 0.85, surface finish factor of 0.9. The material properties of bars aregiven by:ultimate strength of 650 MPa, yieldstrength of 500 MPa and endurance strength of 350 MPa.	**12M**

UNIT-III

5	**a**	Write advantages and disadvantages of welded joint over riveted joints.	**6M**
	b	Double riveted double cover butt joint in plates 20 mm thick is made with25 mm diameter rivets at 100 mm pitch. The permissible stresses are :σt= 120 MPa; τ = 100 MPa; σc= 150 MPaFind the efficiency of joint, taking the strength of the rivet in double shear as twice than that ofsingle shear.	**6M**

OR

6	**a**	What is an eccentric loaded welded joint? Discuss the procedure for designing such a joint.	**5M**
	b	Discuss the standard location of elements of a welding symbol.	**7M**

UNIT-IV

7 Design a sleeve and cotter joint to resist a tensile load of 60 kN. All parts of thejoint are made of the same material with the following allowable stresses :σt= 60 MPa ; τ = 70 MPa ; and σc= 125 Mpa **12M**

OR

8 **a** What are the applications of a cotter joint? **6M**

b A shaft made of mild steel is required to transmit 100 kW at 300 r.p.m. The supportedlength of the shaft is 3 meters. It carries two pulleys each weighing 1500 N supported at a distanceof 1metre from the ends respectively. Assuming the safe value of stress, determine the diameterof the shaft. **6M**

UNIT-V

9 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 exceed1° in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 Mpa. **12M**

OR

10 Two 35 mm shafts are connected by a flanged coupling. The flanges are fittedwith 6 bolts on 125 mm bolt circle. The shafts transmit a torque of 800 N-m at 350 r.p.m. For the safe12M.stresses mentioned below, calculate **12M**

i) Diameterof bolts;

ii) Thickness of flanges;

iii) Key dimensions;

iv) Hub length;

v) Power transmitted.Safe shear stress for shaft material = 63 MPa; Safe stress for bolt material = 56 MPaSafe stress for cast iron coupling = 10 MPa; Safe stress for key material = 46 Mpa.

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