GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII EXAMINATION – WINTER 2025

Subject Code:3171925   **Date:01-12-2025**

Subject Name:Advanced Machine Design

Time:10:30 AM TO 01:00 PM   **Total Marks:70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is Wear? Explain various types of wear in brief.	**03**
	(b)	Explain various modes of fracture with neat sketches.	**04**
	(c)	What is stress concentration? Explain terms theoretical stress concentration factor and fatigue stress concentration factor. Establish a relation between them.	**07**
Q.2	**(a)**	List down the factors that are to be considered while designing the components to avoid fatigue failure.	**03**
	(b)	Define: LEFM approach. What are the advantages of LEFM approach? State the applications of LEFM approach?	**04**
	(c)	Explain the effects of lubrication, velocity and roughness on friction.	**07**
		OR	
	(c)	Explain the hydrostatic and elasto-hydrodynamic lubrication in detail.	**07**
Q.3	**(a)**	Define creep and explain creep curves.	**03**
	(b)	What are the various variables that affect the S-N curve?	**04**
	(c)	Explain Sherby-Dorn and Larson-Miller Parameters for creep deformation	**07**
		OR	
Q.3	**(a)**	Explain the types of fracture in brittle and ductile materials	**03**
	(b)	Why Results obtained by of S-N curve are unreliable? Give three reasons.	**04**
	(c)	If the Larson-Miller parameter for a given elevated temperature alloy was found to be 26,000, by how much would the rupture life of a sample be estimated to decrease if the absolute temperature of the test were increased from 1100 to 1250K? Assume that the Larson-Miller constant is equal to 20.	**07**
Q.4	**(a)**	Why should we evaluate the SIF for a crack in a component?	**03**
	(b)	What is variable amplitude loading? Discuss stress amplitude in fatigue life? What is the difference between stress and stress amplitude?	**04**
	(c)	What is multiaxial fatigue, and why is it important in the design and analysis of mechanical components? How do you calculate the fatigue life of a component subjected to multiaxial loading?	**07**
		OR	
Q.4	**(a)**	Define the terms: (i) Fracture toughness (ii) Stress intensity factor (iii) Fatigue crack propagation	**03**
	(b)	Explain the concept of fatigue life reduction due to notches. How does the size and shape of the notch influence the fatigue life of a component?	**04**
	(c)	What is the Fatemi-Socie model, and how does it integrate stress and strain-based approaches in fatigue analysis?	**07**

Q.5 **(a)** Discuss three ways for designing to avoid surface failure. **03**
(b) Discuss the concept of crack Tip Opening Displacement as a fracture **04**
characterizing parameter indicating when it would be used.
(c) Discuss Design of Mounting Feet with suitable example **07**

OR

Q.5 **(a)** What is Surface Fatigue Strength, and how is it determined? Explain. **03**
(b) Explain the Maximum Principal strain theory. **04**
(c) What is housing seal? Explain Contact seals, Noncontact Seals and Static **07**
Seals with figure.

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