USN | | | | | | | | | | 18AE731

Seventh Semester B.E. Degree Examination, July/August 2022
Fatigue and Fracture Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Discuss in detail about the Goodman and Gurber equation with relevant graph. **(10 Marks)**
   b. Explain Neubers stress concentration factor with neat sketch. **(10 Marks)**

OR

2 a. Explain in detail about the Notched SN curves along with neat sketch. **(10 Marks)**
   b. Explain the following terms :
      i) Mean stress   ii) Notches   iii) Stress concentration factor   iv) Endurance limit. **(10 Marks)**

Module-2

3 a. Explain the low cycle and high cycle fatigue with neat graph. **(10 Marks)**
   b. Discuss in detail about the strain hardening and softening with neat sketch. **(10 Marks)**

OR

4 a. Explain Minen's rule importance in damage calculation in fatigue analysis. **(12 Marks)**
   b. Explain cumulative damage theory in detail. **(08 Marks)**

Module-3

5 a. Explain the various phases of fatigue use along with neat sketch. **(12 Marks)**
   b. Explain the crack initiation in detail and how this crack initiation leads to facture in components. **(08 Marks)**

OR

6 a. Explain in detail about the final fracture due to transformation of bonding phases. With neat sketch. **(12 Marks)**
   b. Discuss in detail about the dislocation of the structure of the metal. **(08 Marks)**

Module-4

7 a. Explain role of potential energy and surface energy in structure mechanics. **(10 Marks)**
   b. Discuss in detail about the Griffith's theory and its application in fracture theory. **(10 Marks)**

OR

8 a. Explain the stress analysis of cracked bodies in detail. **(12 Marks)**
   b. Discuss in detail about the effect of thickness on fracture toughness. **(08 Marks)**

Module-5

9 a. Explain the safe life fatigue structure in detail. **(12 Marks)**
   b. Discuss in detail about the fail safe design philosophies. **(08 Marks)**

OR

10 a. Explain in detail about the importance of fracture mechanics in aerospace structure. **(12 Marks)**
    b. Elaborate the applications of fracture mechanics for the composite materials. **(08 Marks)**

* * * * *