****

**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_

**End Semester Examination – Nov/Dec - 2016**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **12AE225** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **Fatigue and Fracture Mechanics** | **Max. marks :** | **100** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **Marks** |
| **PART-A(10X1=10 MARKS)** | | | |
| 1. | Write Strain- life relation. | | (1) |
| 2. | Fatigue ductility exponent of strong metal is ---------------- | | (1) |
| 3. | Define fracture toughness. | | (1) |
| 4. | Write paris law. | | (1) |
| 5. | Define fatigue notch factor. | | (1) |
| 6. | What is notch sensitivity factor? | | (1) |
| 7. | What is Neuber Relationship? | | (1) |
| 8. | Write Miner’s rule. | | (1) |
| 9. | Define fail-safe design. | | (1) |
| 10. | What is inter-granular fracture? | | (1) |
| **PART B(5 X 3= 15 MARKS)** | | | |
| 11. | Draw S-N curve for notched components. | | (3) |
| 12. | Discuss plane stress and plane strain condition. | | (3) |
| 13. | What are the advantages of Strain life approach? | | (3) |
| 14. | Discuss the weaknesses of stress life approach. | | (3) |
| 15. | What are the factors influencing fatigue crack growth? | | (3) |
| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. | a. | What is meant by stress concentration? Explain how its value can be reduced. | (7) |
| b. | Explain the terms cyclic strain hardening and softening with a sketch. | (8) |
| (OR) | | | |
| 17. | Briefly explain the different approaches to estimate the fatigue life. | | (15) |
| 18. | Briefly explain following technique. | |  |
| a. | Level – crossing counting technique | (5) |
| b. | Peak counting technique | (5) |
| c. | Simple-Range counting | (5) |
| (OR) | | | |
| 19. | a. | Briefly explain the rainflow counting. | (8) |
| b. | Discuss the Linear Damage rule. | (7) |
| 20. | a. | Discuss the factors influencing fatigue crack growth. | (8) |
| b. | Discuss the stress intensity factor for center-cracked plate loaded in tension and edge-cracked plate loaded in tension. | (7) |
| (OR) | | | |
| 21. |  | Briefly explain the mechanism of fatigue crack growth. | (15) |
| 22. |  | Briefly explain the types of dislocation of the materials with suitable sketches. | (15) |
| (OR) | | | |
| 23. |  | Derive an expression for plane stress and plane strain using Griffith’s theory. | (15) |
| 24. |  | Discuss the fatigue problems encountered in subsonic and supersonic aircraft. | (15) |
| (OR) | | | |
| 25. |  | Discuss the Designing against fatigue in aircraft structures. | (15) |

ALL THE BEST