U.S.N

P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester, M.Tech. - Mechanical Engineering (MMDN)
Semester End Examination; May/June - 2019
Fracture Mechanics

Time: 3 hrs   Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

1 a.	Explain fracture mechanics approach to design and what made this different from traditional approach?	10
b.	Explain any five NDT techniques used in fracture mechanics.	10
2 a.	Differentiate between Ductile and Brittle fracture in materials.	10
b.	Derive an expression for critical stress of brittle material using Griffith's energy balance approach.	10

UNIT - II

3 a.	With a neat sketch, give three basic crack deformation modes.	10
b.	Explain the concepts of crack in plastic zones. Describe Irwin's plastic zone correction.	10
4 a.	Explain any two methods of determining fracture toughness.	10
b.	What is compliance? Derive an equation for energy release rate for constant load condition and deduce an expression for energy release rate of DCB specimen.	10

UNIT - III

5 a.	Define J-integral. Explain its usefullness and limitations.	6
b.	Discuss the effect of thickness on fracture tougness.	4
c.	Derive an expression to find out energy release rate using rigid loading method.	7
d.	State the energy release rate criterion.	3
6 a.	Explain the parameters affecting CTOD.	12
b.	Discus the effect of temperature and loading rate on fracture toughness.	8

UNIT - IV

7 a.	What is a crack arrest? How it will be implemented in practice? Illustrate with two examples.	10
b.	Write a short note on : i) Crack branching ii) Dynamic fracture toughness.	10
8 a.	Explain in brief leak before break criteria.	10
b.	Derive an expression for crack propagation speed.	10

UNIT - V

9 a.	Explain the following : i) Fail safe mode of fracture ii) Safe fail mode of fracture	10
b.	Explain the factors affecting crack propagation.	10
10 a.	Explain traditional method in computational fracture mechanics.	10
b	Explain properties of singularity elements.	10

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