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| Image result for nit meghalaya logo | **National Institute of Technology Meghalaya**An Institute of National Importance | **CURRICULUM** |
| Programme | **Bachelor of Technology in Civil Engineering** | Year of Regulation | **2020** |
| Department | **Civil Engineering** | Semester | **V** |
| CourseCode | Course Name | **Pre requisite** | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE319** | **Composite Materials and Structures** | **Nil** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **200** |
| CourseObjectives | 1. To understand the definitions, compositions, advantages, and applications of Composite material.
 | Course Outcomes | CO1 | The students will be able to understand the definitions, compositions, advantages, and applications of Composite material. |
| 1. To understand the mechanical behavior of Composite material.
 | CO2 | The students will be to understand the mechanical behavior of Composite material. |
| 1. To understand the micromechanical analysis of Composite material and elastic properties of the unidirectional lamina.
 | CO3 | The students will be able to understand the micromechanical analysis of Composite material andelastic properties of the unidirectional lamina. |
| 1. To understand and perform the analysis of laminated composites.
 | CO4 | The students will be able to understand and perform the analysis of laminated composites. |
| 1. To understand the failure theories of Composites.
 | CO5 | The students will be able to understand the failure theories of Composites. |
| No. | COs | Mapping with Program Outcomes (POs) | Mapping with PSOs |
| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | CO1 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 2 | CO2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 3 | CO3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 4 | CO4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 5 | CO5 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| SYLLABUS |
| No. | Content | Hours | COs |
| I | **Introduction to Composite Materials**Definitions: Composite material, Fiber, Matrix. Types of Fibers and Raw Fiber Properties, Types of Matrix, Prepregs, Fillers and other Additives. | **4** | **CO1** |
| II | **Advantages and Applications** Advantages of Composite Materials and Structures. Applications and Use of Composite materials in the present world. | **2** | **CO1** |
| III | **Basics of Composites** Mechanical Behaviour of Composite Materials. Lamina, Laminate: The basic building block of a composite material. | **6** | **CO2** |
| IV | **Micromechanical Analysis of Composite Strength and Stiffness** Properties of typical composite materials. Volume and Weight Fractions. Longitudinal Strength and Stiffness. Transverse Modulus. In-plane shear Modulus. Poisson’s ratio. | **8** | **CO3** |
| V | **Elastic Properties of the Unidirectional Lamina** Stress-strain relationships. Engineering Constants. Stress-strain relations of a Thin Lamina. Examples. | **6** | **CO3** |
| VI | **Analysis of Laminated Composites** Laminates, Basic Assumptions, Strain-Displacement Relationship, Stress- Strain Relationships, Equilibrium Equations, Laminate Stiffness, Determination of Lamina Stresses and Strains, Types of Laminate Configuration, Balanced Laminate, Anti-symmetric Laminate, Examples Multichannel Integration: Look at the Big Picture Wireless Applications Enter the Mainstream Middleware: Supporting the Integration Mandate What Is Common to All These Trends? | **5** | **CO4** |
| VII | **Failure Theories**Micromechanics of Failure of Unidirectional Lamina, Anisotropic Strength and Failure Theories, Importance of Shear Strength, Choice of Failure Criteria, Examples. | **5** | **CO5** |
| Total Hours | **36** |  |
| **Essential Readings** |
| 1. Mukhopadhyay M., Mechanics of Composite Materials and Structures, Universities Press.
 |
| 1. Jones R.M., Mechanics of Composite Materials,Technomic Publication.
 |
| 1. Christensen R. M.,Mechanics of Composite Materials, Krieger Publishing Company, Florida, USA.
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| **Supplementary Readings** |
| 1. Herakovich C.T., Mechanics of Fibrous Composites, John Wiley & Sons, Inc. New York, 1998.
 |
| 1. Agarwal B.D. and Broutman L.J., Analysis and Performance of Fibre Composites, John Wiley & Sons, Inc. New York.
 |
| 1. Hodgkinson J.M., Mechanical Testing of Advanced Fibre Composites, Woodhead Publishing Limited, Cambridge, 2000.
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