

B.E Semester: 6 Automobile Engineering
Subject Name: Mechanics of Composite Materials (MA605-N-B)
[Dept. Elect.-2]

A. Course Objective:

- To present a problem oriented in depth knowledge of Mechanics of Composite Materials.
- To address the underlying concepts and methods for development of composites.
- To learn investigation techniques for composite materials.
- This subject offers the knowledge and understanding of the engineering behaviour of composite materials, preliminary design concepts and their appropriate use.

B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	Principles of composites, micromechanics of composites. Various types of reinforcements and their properties. Classification and characteristics of composite.
2	Role of interfaces. Mechanical behaviour of composite materials.
3	Reinforcements. Matrix materials. Green composites.
4	Fabrication of metal matrix composites: dispersion hardened, particle, whisker and fibre reinforced; composite coatings by electrode position and spray forming.
5	Fabrication of polymeric and ceramic matrix composites.
6	Mechanical physical properties of composites. Mechanisms of fracture in composites. Failure theories. Design optimization.
7	Property evaluation and NDT of composites. Wear and environmental effects in composites. Engineering applications of composites.

Total hours (Theory):48
Total hours (Practical):32
Total hours:80

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 st ,2 nd ,3 rd	Unit 1	20%	1
2	4 th ,5 th ,6 th	Unit 2	20%	2

3	7 th , 8 th , 9 th	Unit 3	20%	3,4
4	10 th , 11 th , 12 th	Unit 4	20%	5,6
5	13 th , 14 th , 15 th , 16 th	Unit 5	20%	7

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carry five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures. Suggested list of experiment is given below

F. List of Practical:

1	Manufacturing of particle reinforced composites.(carbon particle, aluminium particle, carbide particle)
2	Testing and investigation of particle reinforced composites.
3	Manufacturing of fibre reinforced composites.(wire, glass fibre)
4	Testing and investigation of particle reinforced composites.
5	Code development for particle size count with image processing tool in Scilab.
6	Composite repair technique study.
7	Composite replacement case studies by each student.

G. Students Learning Outcomes:

1	The student can identify different areas of Mechanics of Composite Materials.
2	Can find the applications of all the areas in day to day life.

H. Text Books & Reference Books:

1	Composites, Engineered Materials Handbook, Vol.1, ASM International, Ohio, 1988.K.K. Chawla
2	Principles of Composite Material Mechanics By Ronald F. Gibson, Published February 5, 2016, ISBN 9781498720694. CRC Press
3	MECHANICS OF COMPOSITE MATERIALS, By ROBERT M. JONES, Taylor & Francis,
4	Materials Design Using Computational Intelligence Techniques, by Shubhabrata Datta, ISBN :978148223832, CRC press.
5	Structure and Properties of Composites, Materials Science and Technology, Vol.13, VCH, Weinheim, Germany, 1993.
6	PRINCIPLES OF COMPOSITE MATERIAL MECHANICS, by Ronald F. Gibson, McGraw-Hill, Inc. ISBN 0-07-023451-5

