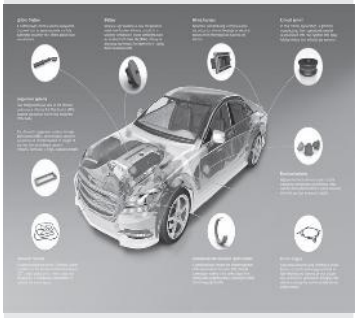
19AE203 MATERIALS FOR AUTOMOTIVE COMPONENTS



Source :
httpswww.bodeseal.com

Hours Per Week :

L	T	P	C
3	0	2	4

Total Hours :

L	T	P
45	-	30

CS	WA/RA	SSH	SA	S	BS
5	5	30	20	5	5

COURSE DESCRIPTION AND OBJECTIVES:

This course offers the basic classification of materials and different materials used in automotive components. The objective of this course is to provide the knowledge of properties and applications of ferrous, non-ferrous metals, polymers and composite materials and their production processes.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to achive the follwoing out comes

COs	Course Outcomes	POs
1	Understand the fundamentals rerlated to production methods of metals and processing of materials for automotive applicatins. and isotropic materials.	1,10
2	Apply the knowledge to re cognize the different materials used in Automotive Industries.	10,12
3	Analyze the samples and study various micro structures of steels. with thin-wall spherical and cylindrical pressure vessels.	2,9,10
5	Evaluate mechanical properties of solids, factors affecting such properties in order to select materials.	9,10

SKILLS:

- ✓ Distinguish metals, ceramics, polymers and composites.
- ✓ *Analyze micro structures of materials such as mild steels, low carbon steels, high carbon steels etc.*
- ✓ *Measure hardness of steels*
- ✓ *Prepare samples for micro structure studies*
- ✓ *Ability to select suitable materials for automobile applications.*

UNIT – I **L-9**

SIMPLE STRESSES AND STRAINS : Types of Stresses and Strains, Hooke's law, Stress strain diagram for ductile and Brittle materials, Salient points, Elastic constants and relations, Simple and compound bars, Thermal stresses, Stress on an oblique plane, Principle stresses – Mohr circle for 2D, Strain Energy, Resilience, Gradual, Sudden, Impact and Shock loadings.

UNIT – II **L-9**

SHEAR FORCE AND BENDING MOMENT: Types of loads and beams, Relation between shear load, Shear force and bending moment, Shear force and bending moment diagrams, Cantilevers – Simply supported beams and overhanging beams subjected to point loads, UDL Point of contra flexure.

DEFLECTION OF BEAMS: Introduction, Deflection equation for elastic curve of a beam, Deflection, Slope for cantilever beam and simply supported beams – point loads, UDL (Elementary treatment).

UNIT – III **L-9**

FLEXURE AND SHEAR STRESSES : Theory of simple bending, Assumptions, Flexural formula, Bending stresses in beams for various cross sections, Shear stresses in beams, Assumptions and derivation for variation of shear stress, Shear stress distribution for various cross-sections.

UNIT – IV **L-9**

TORSION: Introduction, Torsion equation, Shear stress distribution for circular solid and hollow shafts, Stepped shafts, Shafts fixed at both the ends.

UNIT –V **L-9**

PRESSURE VESSELS: Thin cylindrical shells: Introduction, Hoop stress and longitudinal stress, and strains. Thin spherical shell - stresses.

COLUMNS AND STRUTS : Introduction, Euler's Formula for critical load of columns for different end conditions, Limitations of Euler's theory, Rankine's formula, Simple Numerical.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS : 30**

1. Conduct a Direct tension test to determine the tensile behavior of the specimen in UTM
2. Conduct a Bending test to study the deflection of
   a) Simply supported beam b) Cantilever beam
3. Conduct a Torsion test to verify the torsion formula
4. Conduct a Hardness test to determine the hardness of the given specimen on
   a) Brinell hardness tester b) Rockwell hardness tester
5. To obtain the spring constant for the given springs
6. Conduct Compression test on cube to determine the behavior of the material under compression
7. Conduct an Impact test to determine the impact strength of the materials

TEXT BOOKS:

1.L. N. Srinath, "Advanced Mechanics of Solids", 3rd edition, Tata McGraw-Hill, 2010.
2.Sadhu. Singh, "Strength of Materials", 2nd edition, Khanna Publications, 2008.

3.Strength of materials by Ramamrutham- Dhanpat Rai Publishing Company (P) Limited, 2008

REFERENCES BOOKS :

1.Bhavikatti, "Strength of Materials", 3rd edition, New Age International Publishers, 2011.
2.S. Timoshenko, "Strength of Materials", 3rd edition, D. Van Nostrand Company, 2004.
3.P. P. Egor, "Engineering Mechanics of Solids", 2nd edition, Prentice Hall of India, 1999.