

GUJARAT TECHNOLOGICAL UNIVERSITY

RUBBER TECHNOLOGY (26) TYRE & TUBE TECHNOLOGY SUBJECT CODE: 2182607 B.E. 8TH SEMESTER

Type of course: BE

Prerequisite: NA

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
				PA	ALA	ESE	OEP			
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1.	Introduction & Terminology production of variety of tyres in India & abroad.	4	5
2.	Structure Of The Pneumatic Tyre: Functions of the pneumatic tyre, tube & assembly, Construction of tyre tread casing & bead general features, Principles of Cross-ply, radial & bias-belted construction, tubeless tyre, Tyre construction methods, Cord path, Aspect ratio.	5	10
3.	Tyre Manufacture: Composition of tyre, compounding of tyre tread cap tread base, carcass, bead, sidewall, inner liner etc. Raw materials for tyre, Mixing, Dipping, Calendaring, Extrusion, stock preparation, tyre building, green tyre preparation, tyre curing, PCI, finishing of tyre. Manufacturing process of radial tyre.	5	10
4.	Tyre Cord & Cord To Rubber Bonding: Physical properties of tyre cords from cotton, rayon, nylon etc. Outline of bonding methods, etc	5	10
5.	Tyre Design: Tyre structure, tyre shape, treads design. Tyre size determination.	5	10
6.	Tyre Performance Analysis: Analysis of tyre for different performance criteria like tyre stresses & deformation, tyre stiffness, tyre noise, rolling resistance, aquaplaning etc.	5	10
7.	Tyre Evaluation: Evaluation of tyres by machine tests, Contact pr. & its relation to traction & wear, tyre steering & road interaction. Tyre testing – destructive and non destructive.	5	10
8.	General Developments: In material construction & performance assessments. Tyre Standards. Performance & design criteria, manufacturing of cycle, Motor cycle, automobile, truck, earthmover, air- craft & tubeless tyre.	5	10

9	Tubes: Principles of tube design, mfg. tubes, extrusion, valve jamming, inflation & Curing in presses, tube testing.	5	10
10	Flaps: Properties, Compounding, Manufacturing and testing of flaps.	5	10
11	Retreading: Criteria for retreading, methods of retreading.	5	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
14	14	14	14	14	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Rubber Products Manufacturing Technology By: Anil K. Bhowmick
2. Tyre Technology By: Tom French.
3. Tyre Manufacturing & Engineering By: F. J. Kovac.

Course Outcome:

After learning the course the students should be able to:

- Able to learn about the Functions of the pneumatic tyre.
- Compare the different types of tyre.
- Know about the Manufacturing process of different types of tyre
- Understand the importance of Physical properties of tyre cords made of different fabric.
- Understand about the Tyre structure, tyre shape, tread design. Tyre size determination.
- Learn about the tyre performance analysis.
- Able to learn about Evaluation of tyre by machine tests.
- Know about the Properties, Compounding, Manufacturing and testing of flaps.
- Learn about importance of retreading.

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Design based Problems (DP)/Open Ended Problem:

- Tyre Choice by Seasons.
- Importance of rolling Resistance in tyre Design.
- Optimization of Tyre Design & Construction Parameter Handling

Major Equipment:

Mixing mill, Calender Machine Extruder, Semi Hydraulic Press etc.

List of Open Source Software/learning website:

- <http://www.checkthatcar.com/>
- <http://www.continental-tires.com/>
- <http://www.altairatc.com/>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.