



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3160213

Special Purpose Vehicle

6th SEMESTER

Type of course: Advanced Application

Prerequisite: Automobile Systems

Rationale:

The subject is designed to provide application of automotive systems in special purpose vehicles. The course is essential to build higher skill by studying the details of construction, working and design aspects of special purpose vehicles such as agriculture vehicles, earth moving machines, load caring and lifting machines.

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)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1.	Introduction : Classification of Special Purpose Vehicles, wheel type & track type, applications, Vehicles for differently challenged persons.	3
2.	Principles and design considerations of special purpose vehicles: Study of working principles and design considerations of different systems involved such as power system, transmission, final drive, lubrication, electrical, braking, steering, pneumatic & hydraulic control circuits.	10
3.	Earth Moving Machines: Construction and working features of different types of earth moving machinery such as Tippers, Scrapers and shovels, Loaders, Excavators, Dumpers, Bulldozers, Fork Lift and Road rollers.	10
4.	Tractors: Classification of tractors-lay out of wheeled tractor- power transmission system & drive line - steering system - accessories of wheeled tractors- hydraulic control system- power take off unit.	6
5.	Mobile Cranes: Basic characteristics of truck cranes, stability and design features, control systems and safety devices.	5



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3160213

6.	Special purpose vehicles: Features of Oil tankers- Articulated vehicles, working -features of Ambulance, fire extinguishing vehicle and Tipper-working of Hover craft.	6
7.	Ergonomic considerations: Human factors in special purpose vehicle design with reference to comfort, convenience and safety, effects of noise, vibration and thermal stresses on human performance. Economics of special purpose vehicle utilization.	5

Suggested Specification table with Marks (Theory):

R Level	U Level	A Level	N Level	E Level	C Level
20	25	30	20	5	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. Y. Pokras and M. Tushnyakov, "Construction Equipment Operation & Maintenance", MIR, Moscow.
2. A. Astskhov, "Truck Cranes", MIR, Moscow.
3. E.G. Poninson, "Motor Graders", MIR, Moscow.
4. Hand book of Earth Moving Machinery - Central Water & Power Commission (Govt. of India)
5. N. Rudenko, "Material Handling Equipment", M.R. Publishers.
6. Sheldon, R.Shacket, "Electric Vehicles", Domus Books, New York.
7. David A. Day, Neal B. H. Benjamin, "Construction Equipment Guide", Wiley.
8. C.P. Nakra, "Farm Machines and Equipment", Dhanpat Rai Publications, New Delhi.
9. Donnell hunt and L .W.garver - Farm machinery and mechanism - Iowa state university press.
10. J.Y Wong - Theory of Ground vehicles - John Wiley and Sons.

Course Outcome: After learning the course the students will able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Classify special purpose vehicles and its ergonomic considerations	17
CO-2	Enumerate design considerations of special purpose vehicles	21
CO-3	Examine different features of various types of earth moving machinery such as Tippers, Scrapers and shovels, Loaders, Excavators, Dumpers, Bulldozers, Fork Lift and Road rollers, Tractors	33
CO-4	Assess design features of Mobile Cranes:	11
CO-5	Summarize Features of Articulated vehicles, Ambulance, fire extinguishing vehicle and Tipper-working of Hover craft.	18



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3160213

List of Experiments

1. Study of tipping mechanism of a dumper
2. Study of forklift truck
3. Study of operation of a truck crane
4. Study of technical & operational features of a tractor
5. Study of technical & operational features of a power scraper
6. Study of technical & operational features of a power hoe and shovel.
7. Study of a fire extinguishing vehicle
8. Study of a Ambulance
9. Study of features of mobile cranes
10. Study of Ergonomics considerations of special purpose vehicles.

Major Equipment: Wind Tunnel,

List of Open Source Software/learning website:

1. <http://nptel.ac.in>