SARVAJANIK UNIVERSITY

Sarvajanik College of Engineering and Technology

Bachelor of Technology

Mechanical Engineering

Semester IV

Course Name: **Vehicle Maintenance, Safety and Laws** **Course Code: BTME19421**

Type of course: **Honors -Advances in Automobile Engineering**

Prerequisite: Zeal to learn the course.

Rationale of Course: The course is designed to understand basic concepts used in automobile and its maintenance and safety related to vehicle. Subject will cover various transport management aspects and motor vehicle laws after studying this subject the students will be able to manage a transport fleet and their related activities.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
4	0	0	4	60	25	15	00	00	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Total Hrs	Module Weitage
1	**Vehicular Maintenance and Measuring Instruments:** Requirements and importance of service & maintenance, Preventive, Predictive & Breakdown maintenance. Measuring instruments for Fuel consumption, speed, acceleration, vibration, noise. Methods used for measurement of fuel consumption.	06	12%
2	**Maintenance & Overhauling of engine components:**	04	6%

	Measurement of cylinder bore, cylinder boring and honing, liners fitting. Cylinder head facing, valve seat lapping. Adjustment of valve timing and fuel injection pump timing. Rocker arm gap adjustment/setting procedure. Tuning of carburetor. Fuel injection pumps and fuel injector's calibration. Engine Lubrication circuit and it components, Fuel supply circuit of petrol, Diesel, Bi-Fuel engines, Cooling system layout and its components, Air intake & Exhaust systems and components		
3	**Maintenance & Overhauling of various systems:** Lubrication and maintenance of suspension system. Study and adjustment of steering geometry; toe in, toe out, caster, camber, and king pin inclination. Maintenance of steering system. Maintenance of wheel and tyre. Tyre rotation, tyre re-treading, effect of tyre inflation & tyre wear. Wheel balancing. Maintenance of hydraulic brakes; brake adjustments and bleeding of brakes. Study of air brake circuit & system components. Maintenance of radiator and water cooling system. Maintenance of lubrication system; chassis greasing, wheel bearing greasing etc. Hydraulic and Air Brake circuits and its components. Maintenance of electrical system components.	**10**	**15%**
4	**Diagnosis, Causes, and Remedies :** Causes & remedies of different problems related engine (high fuel consumption, high engine oil consumption, Over heating of engine), clutch, gearbox, propeller shaft, differential, final drive, brakes, suspension, steering, wheels & tires, battery, Starting circuit & Charging circuit etc.	**04**	**5%**
5	**Workshop management practices :** Study of Workshop documents & records like job cards, parts catalogue, parts price list, vehicle history sheet, warranty card, bill & billing procedure of vehicle, logbook of vehicle, customer satisfaction sheet, service book, etc. Activities and responsibilities of workshop management. Study of workflow in service station.	**06**	**12%**
6	**Motor Vehicle Act:** Acts & definitions, Licensing of drivers and conductors, registration of vehicles, control of transport, RTO and other regulations, offences,	**10**	**15%**

	penalties and procedures, types of form and procedures, licensing of taxies and buses, rules and regulations, testing and passing of vehicles. Description of goods carrier, delivery van, tanker, tipper, municipal, firefighting and break down service vehicle. Taxation: Structure, method of laying taxation, goods vehicle taxation, passenger vehicle taxation, mode of payment, tax exemption, one / life time taxation. Service Life of vehicles. Toll tax reasons & operational management. Build Operate Transfer arrangement. Highway traffic rules, Taffic signs, Natinal and international driving conditions / rules.		
7	**The Concept of Vehicle Safety:** Need of safety, active safety: driving safety, conditional safety; perceptibility safety, operating safety- passive safety, exterior safety, interior safety, deformation behaviour of vehicle body. **Vehicle Safety System:** Regulations, automatic seat belt Tightener system; Collapsible steering column; Tiltable steering wheel. Electronic system for activating air bags; Bumper design for safety; antiskid braking system.	**08**	**15%**
8	**Accident & Prevention:** Vehicle accident, laws, injury, safety precautions, road transport regulations. Insurance: Insurance & Finance Classes/types of insurance, accident claims and settlements, duty of driver in case of accident, hire purchase.	**06**	**10%**
9	**Laws Related to Pollution Under Control (PUC):** Pollution Under control certification agency, Authority & procedure for PUC certification agency. Harmful exhaust gas constituents, permissible limits, Euro / Bharat Stage -I, II, III, IV norms and implementation, testing and measurements.	**06**	**10%**

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**30**	**30**	**10**	**10**	**10**

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:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Automotive Mechanics	William H. Crouse & Donald L. Anglin	Tata McGraw Hill.	2007	10th
2.	Automobile Engineering	Anil Chikara	Satyam Prakashan	2009	1st
3.	Basic Automotive Service And Systems	Owen C E	Cengage Learning	2011	4th
4.	M.V. Act	India code	RTO rules and regulation manual	1988	
5.	The Motor Vehicles Act	Law Publishers	Law Publishers	2004	4th
6.	Vehicle Workshop Manual.				

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Learning of maintenance types/techniques.	20
CO-2	Learning of different garage equipment and practices.	30
CO-3	Understand and have knowledge about different aspects related to workshop system and will be able to manage.	20
CO-4	Know about the motor vehicle act and laws related to PUC Norms.	15
CO-5	Understand various types of insurance and taxation policies.	15

Mapping with Program Outcomes (PO's) and Program Specific Outcomes (PSO's):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO-1	3	2	3	1	2	2	1	0	2	1	1	2	2	0	2
CO-2	3	3	3	1	3	2	0	1	2	1	2	2	2	1	2
CO-3	3	3	3	3	3	2	0	0	2	1	2	2	0	1	3
CO-4	2	1	2	0	1	2	2	2	2	1	0	2	2	0	3
CO-5	1	1	1	0	1	2	1	2	2	1	1	2	2	0	2
Rationale*	**12**	**10**	**12**	**5**	**10**	**10**	**4**	**5**	**10**	**5**	**6**	**10**	**8**	**2**	**12**

***Rationale of CO-PO-PSO mapping*:** This course highly maps with PO 1,2,3,5,6,12 and PSO 3, it states that the course will develop automobile Engineering knowledge, Problem analysis, Design / development of solutions, Modern tool usage, Life-long learning, engineer and society, Individual and teamwork. This Course also focuses on knowledge of workshop garage and maintenance of automobile.

List of Open learning website: https://onlinecourses.nptel.ac.in

List of Open Source Software: Nil.