

BME504 – AUTOMOBILE ENGINEERING

Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Mechanical Engineering
BME504 – AUTOMOBILE ENGINEERING
Fifth Semester, 2015-16 (odd Semester)

Course (catalog) description

- To understand the construction and working principle of various parts of an automobile.
- To have the practice for assembling and dismantling of engine parts and transmission system

Compulsory/Elective course : Compulsory

Credit & contact hours : 3 & 45

Course Coordinator : R.Sabarish

Instructors : R.Sabarish, R.J. Golden Renjith Nimal, S. Manavalan

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in)	Consultation
R.Sabarish	III-A	JR001		sabarish.mech@bharathuniv.ac.in	9.00 - 9.50 AM
R.Sabarish	III-B	JR002		sabarish.mech@bharathuniv.ac.in	10.50 - 11.40 AM
R.J. Golden Renjith Nimal	III-C	JR003		goldenrenjith.mech@bharathuniv.ac.in	11.40 -12.30 PM
R.J. Golden Renjith Nimal	III-D	SK004		goldenrenjith.mech@bharathuniv.ac.in	9.50-10.40 AM
S. Manavalan	III-E	SK003		manavalan.mech@bharathuniv.ac.in	9.00 - 9.50 AM
S. Manavalan	III-E	SK002		manavalan.mech@bharathuniv.ac.in	11.40 -12.30 PM

Relationship to other courses:

Pre –requisites : Manufacturing Technology I & II, Machine Design

Assumed knowledge : To understand the construction and working principle of various parts of an automobile. To have the practice for assembling and dismantling of engine parts and transmission system

Following courses : Nil

Syllabus Contents

UNIT I VEHICLE STRUCTURE AND ENGINES 9

Vehicle construction – Chassis, frame and body- Engine types-Construction-Operation-Turbo and Supercharger engine. Cylinder arrangements-Performance& balancing-engine locations-engine trouble shooting-Pollution norms-Catalytic converter-Indian &Euro emission standards.

UNIT II TRANSMISSION SYSTEMS 9

Clutches-types & Construction- fluid coupling-types-torque converter-Advantages-gear box-types-advantages-gear ratios-automatic transmissions-propeller shaft-universal joint-slip joint-Differential-rear axle. Brakes -Types-Mechanical, Hydraulic, Pneumatic, Power brake. Details of components.

UNIT III STEERING AND SUSPENSION SYSTEMS 9

Principle of steering-Steering geometry and wheel alignment-Steering linkages- Power steering-Wheel and tyres-Construction-Types and specification-Tyre wear and causes-Front and rear axle, Suspension Systems – Needs and Types-Springs-Torsion bar-Shock Absorber.

UNIT IV ENGINE AUXILLARY SYSTEMS 9

Carburetors-Electronic fuel injection systems-Single and multi points types-Principles of modern electrical systems-battery-Dynamo-Alternator-Starting motor-Lighting and ignition(Battery and Electric systems)-Automobile air conditioning.

UNIT V ALTERNATIVE FUELS 9

Alternative fuels-Hydrogen-Compressed natural gas (CNG)-Liquefied petroleum gas (LPG), Fuel cells, Electric hybrid vehicle.

TEXT BOOKS:

1. Kirpal Singh, Automobile Engineering, Vol 1 and 2 –Standard Publications, 2004.

REFERENCES:

1. R.B.Gupta, Automobile Engineering, Satya Prakashan, 2007.
2. Ganesan. V.”Internal Combustion Engines”,TMH,2003
3. K.K.Ramlingam,”Automobile Engineering”, 2002.
4. https://books.google.co.in/.../A_Text_Book_of_Automobile_Engineerin..

Computer usage:

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	100%
Professional subject	-	0%

Broad area: Suspension system, Testing, Research

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	13.08.2015	Session 1 to 13	2 Periods
2	Cycle Test-2	23.09.2015	Session 13 to 27	2 Periods
3	Model Test	02.11.2015	Session 1 to 45	3 Hrs
4	University Examination	06.12.2015	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

Student Outcomes (SOs) from Criterion 3 covered by this Course	Correlates to program outcome		
	H	M	L
Learn vehicle structures	a,b,k,l	h,i	c
Students will learn the different types of engines	a,b,k	h,i	c
Transmission systems will be learnt	k,l	h	
The students will learn about the engine auxiliary systems	a,l	b,i	c
Students will learn about alternate fuels	b	a,h,i,k,l	
Students learn about suspension systems and steering wheels	b	a,h,i,k,l	c

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT 1 VEHICLE STRUCTURE AND ENGINES			
1	Vehicle construction Chassis,	No	T1 & R3
2	frame and body-	No	
3	Engine types-Construction-Operation	No	
4	Turbo and Supercharger engine.	No	

5	Cylinder arrangements	No	
6	Performance& balancing-engine locations	No	
7	engine trouble shooting-Pollution norms	No	
8	Catalytic converter	No	
9	Indian &Euro emission standards.	No	
UNIT II TRANSMISSION SYSTEMS			
10	Clutches-types & Construction	No	T1 & R1
11	fluid coupling-types -torque converter Advantages	No	
12	gear box-types-advantages	No	
13	gear ratios-automatic transmissions	No	
14	propeller shaft-universal joint-slip joint	No	
15	Differential	No	
16	rear axle.	No	
17	Brakes -Types-Mechanical, Hydraulic, Pneumatic	No	
18	Power brake. Details of components.	No	
UNIT III STEERING AND SUSPENSION SYSTEMS			
19	Principle of steering	No	T1 & R2
20	Steering geometry and wheel alignment	No	
21	Steering linkages	No	
22	Power steering	No	
23	Wheel and tyres-Construction-Types and specification	No	
24	Tyre wear and cause	No	
25	Front and rear axle, Suspension Systems	No	
26	Needs and Types-Springs	No	
27	Torsion bar-Shock Absorber.	No	
UNIT IV ENGINE AUXILLARY SYSTEMS			
28	Carburetors	No	T1 & R3
29	Electronic fuel injection systems	No	
30	Single and multi points types	No	
31	Principles of modern electrical systems-	No	
32	Battery	No	
33	Dynamo systems	No	
34	Alternator-Starting motor	No	
35	Lighting and ignition(Battery and Electric systems)	No	
36	Automobile air conditioning.	No	
UNIT V ALTERNATIVE FUELS			
37	Fuels	No	T1 & R2
38	Alternative fuels	No	
39	Hydrogen	No	
40	Compressed natural gas (CNG)	No	

41	Liquefied petroleum gas (LPG),	No
42	Fuel cells,	No
43	hybrid vehicle.	No
44	Electric hybrid vehicle.	No
45	Electric hybrid vehicle.	No

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment / Seminar / Online		
Test / Quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by **R.Sabarish**

Addendum

ABET Outcomes expected of graduates of B.Tech / MECH / program by the time that they graduate:

- The ability to apply knowledge of mathematics, science, and engineering fundamentals.
- The ability to identify, formulate and solve engineering problems.
- The ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- The ability to design and conduct experiments, as well as to analyze and interpret data
- The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- The ability to apply reasoning informed by the knowledge of contemporary issues.
- The ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

- h) The ability to understand professional and ethical responsibility and apply them in engineering practices.
- i) The ability to function on multidisciplinary teams.
- j) The ability to communicate effectively with the engineering community and with society at large.
- k) The ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.
- l) The ability to recognize the need for, and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION:

Mechanical Engineering graduates are enthusiastic to provide strong foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems in the field of Mechanical Engineering.

PEO2: CORE COMPETENCE:

Mechanical Engineering graduates have competence to enhance the skills and experience in defining problems in the field of Mechanical Engineering and Technology design and implement, analyzing the experimental evaluations, and finally making appropriate decisions.

PEO3: PROFESSIONALISM:

Mechanical Engineering graduates made competence to enhance their skills and embrace new thrust areas through self-directed professional development and post-graduate training or education.

PEO4: PROFICIENCY:

Mechanical Engineering graduates became skilled to afford training for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS:

Mechanical Engineering graduates are morally merged to apply the ethical and social aspects of modern Engineering and Technology innovations to the design, development, and usage of new products, machines, gadgets, devices, etc.

BME504 – AUTOMOBILE ENGINEERING

Course Teacher	Signature
R.Sabarish	
R.J. Golden Renjith Nimal	
S. Manavalan	

Course Coordinator
R.Sabarish

HOD/MECH