

KSV UNIVERSITY



LDRP INSTITUTE OF TECHNOLOGY & RESEARCH

MECHANICAL ENGINEERING DEPARTMENT

SYLLABUS (2017-18)

M.E. MECHANICAL-AUTOMOBILE ENGINEERING

KADI SARVA VISHWAVIDYALAYA LDRP Institute of Technology & Research Gandhinagar 382015

30/04/2018

The meeting of the Program Committee (Board of Studies) under the Faculty of Engineering & Technology, for Mechanical/Automobile is scheduled on Monday, the 30th April, 2018 at 01:00 P.M. in the Board Room of the University, with the following Agenda:

- > TEACHING AND EXAMINATION SCHEME WITH DETAIL SYLLABUS OF B.E. II YEAR (3_{RD} AND 4_{TH} SEMESTER) AND M.E. II YEAR (3_{RD} AND 4_{TH} SEMESTER - PRODUCTION/THERMAL/AUTOMOBILE ENGINEEIRNG).
- TEACHING AND EXAMINATION SCHEME OF B.E. III AND IV YEAR (5_{TH} TO 8_{TH} SEMESTER) TO B.E. IV YEAR (MECHANICAL/AUTOMOBILE ENGINEEING).

The following Committee members were present in Program Committee (Board of Studies) under the Faculty of Engineering & Technology,

1. Dr Gargi Rajpara, Principal LDRP-ITR 2. Prof. S. K. Mantra, Registrar, KSV 3. Prof. P. K. Shah, COE, KSV 4. Prof. Anand Dhruve, VGCE - Ahmedabad 5. Prof. R J Jani, LDCE - Ahmedabad 6. Dr N M Bhatt, Director, GIT, Moti Bhoyan, Gandhinagar. 7. Prof. U V Shah, Associate Professor, GEC, Modasa. 8. Dr D H Pandya, Prof. & HOD, Mechanical 1st Shift, LDRP-ITR, Gandhinagar. 9. Dr N S Mehta, Prof. & HOD, Mechanical 2nd Shift, LDRP-ITR, Gandhinagar. Dr T M Patel, Professor, Mechanical Engineering, 10. LDRP-ITR, Gandhinagar. Prof. A M MAVANI, Asst. Prof., Mechanical 11. Engineering, LDRP-ITR, Gandhinagar. Prof. Vidya Nair, Asst. Prof., Mechanical 12. Engineering, LDRP-ITR, Gandhinagar. Prof. Mrunal Pandya, Asst. Prof., Mechanical 13. Engineering, LDRP-ITR, Gandhinagar

14. Prof. Anirudh Kyada, Asst. Prof., Mechanical Engineering, LDRP-ITR, Gandhinagar

The discussion included

U.G. - AUTOMOBILE/MECHANICAL SECOND YEAR TEACHING AND

EXAMINAITN SCHEME

- It is suggested to replace Advanced Strength of Material with Material Science and Metallurgy is semester 3 with same teaching and examination scheme (3-0-2).
- 2. It is suggested to transfer the topic of friction from Kinematic of Machine (semester 3) to Theory of Machine (semester 5) and add Synthesis and analysis of Mechanics in subject Kinematic of Machine in semester 3.
- 3. It is suggested to replace the subject of Differential Equation and Integral Transforms with Engineering Mathematics III in 3rd semester Automobile Engineering. It is also recommended to discus the syllabus of the same in the BOS of Mathematics.
- 4. It is suggested to correct the name of the subject Complex Analysis and Numerical Analysis in semester 4 in consultation with BOS of Mathematics.
- 5. Teaching and Examination scheme of subject IDMD is suggested to change from 3 - 0 - 4 to 3 - 0 - 2. It is also recommended by BOS members to give 1 (one) hour as a practice in Industrial Drafting and Machine Design and credit of the same should not counted. It is recommended to redesign the syllabus of subject as per suggestion provided by BOS members.
- 6. It is suggested to interchange the subject of Thermodynamics (Semester 4) with Fluid Mechanics (Semester 3) in respective semesters.
- 7. It is suggested to utilize 2 hours of Audit course of Semester 3 and 4 to provide as an additional teaching hours for the other subject/ subjects of the same semester without considering the credit of the same.
- 8. It is also recommended by the BOS members to specify the outcome of each topic of all subjects.
- 9. It is recommended to add more numbers of standard book in all subject.
- 10. Typographical error was observed by the members and it recommended to rectify the same.

- 11. Some discrepancy was observed in the format of syllabus of M.P. I (semester 3), it is recommended to correct it.
- 12. It is suggested by BOS members to rename the name of Subjects namely, M.D. I, M.D. II, M.P. I and M.P. II etc. from the student transcript point of view.
- 13. Add more number of Elective Subject in Semester 5 to semester 8.

TEACHING AND EXAMINATION SCHEME OF M.E. II YEAR (Production/Thermal/Automobile).

Teaching and Examination Scheme with detail syllabus of M.E. II year (Production/Thermal/Automobile) is approved without any modification.

Prof. (Dr.) D.H.Pandya HOD-Mechanical Engineering Dr. Gargi Rajpara Principal

Kadi Sarva Vishv Scheme for Teaching Master of Engineering Mechani With Effect From: Academi M.E. MECHANICAL-AUTOMOBILE	wavid and E cal-Au c Year E ENG	yalay Exami utomo r 2017 INEEF	a natio obile 7 – 18 RING S	n Engine (CBCS) SEMEST	ering) TER – I						
SUBJECT	Те	achin	g Sch	eme	Total		Eva	aluation	Scheme		_
NAME	L Hrs	T	P Hrs	Total	Credit	T Hrs	heory Marks	IE Marks	CIA	Pract. Marks	TC Marks
	2	0	0	2	2	3	70	30	20	-	1
AUTOMOBILE SAFETY, MAINTENANCE & POLLUTION CONTROL	4	0	0	4	4	3	70	30	20	-	1
VEHICLE DYNAMICS	3	0	2	5	4	3	70	30	20	30	1
ADVANCED AUTOMOTIVE SYSTEM	3	0	2	5	4	3	70	30	20	30	1
SEMINAR-1	0	0	2	2	1	-	-	-	60	100	1
ELECTIVE – I	4	0	2	6	5	3	70	30	20	30	1
ELECTIVE – II	4	0	2	6	5	3	70	30	20	30	1
ΤΟΤΑΙ	20	0	10	30	25	18	420	180	180	220	10
M.E. MECHANICAL-AUTOMOBILE	ENG	INEER	ING S	SEMEST	TER – II						
SUBJECT	Те	achin	g Sch	eme	Total		Eva	aluation	Scheme		Тс
	L	Т	Р	Total	Credit	Т	heory	IE	CIA	Pract.	
NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks

CODE

MECC101-N

MEAE102-N

MEAE103-N

MEAE104-N

MEAE105-N

MEAE106-N-_

MEAE107-N-_

Total

120

120

150

150

160

150

150 **1000**

Total

			leory	IE	CIA	Pract.						
CODE	NAME	Hrs	Hrs	Hrs	Hrs	creat	Hrs	Marks	Marks	Marks	Marks	Marks
MECC201-N	TECHNICAL COMMUNICATION (UNIVERSITY ELECTIVE)	2	0	0	2	2	3	70	30	20	-	120
MEAE-202-N	AUTOMOTIVE COMPONENT DESIGN	4	0	2	6	5	3	70	30	20	30	150
MEAE-203-N	FUELS, ALTERNATIVE FUELS & LUBRICANTS	3	0	2	5	4	3	70	30	20	30	150
MEAE-204-N	TRANSPORT MANAGEMENT & LAWS	3	0	0	3	3	3	70	30	20	-	120
MEAE-205-N	SEMINAR-2	0	0	2	2	1	-	-	-	60	100	160
MEAE-206-N	ELECTIVE – III	4	0	2	6	5	3	70	30	20	30	150
MEAE-207-N	ELECTIVE – IV	4	0	2	6	5	3	70	30	20	30	150
	TOTAL	20	0	10	30	25	18	420	180	180	220	1000

	M.E. MECHANICAL-AUTOMOBILE ENGINEERING SEMESTER – III												
	Teaching Scheme				Total		Eva	Total					
SUBJECT			Т	Ρ	Total	Crodit	Theory		IE	CIA	Pract.		
CODE	NAME	Hrs	Hrs	Hrs	Hrs	creat	Hrs	Marks	Marks	Marks	Marks	Marks	
MEAE301-N	ENERGY CONSERVATION AND MANAGEMENT	4	0	2	6	5	3	70	30	20	30	150	
MEAE302-N	DISSERTATION PHASE 1	-	-	1	-	15	I	-	-	50	150	200	
MEAE303-N	ELECTIVE V	4	0	2	6	5	3	70	30	20	30	150	
	TOTAL	7	13	10	30	25	6	140	60	90	210	500	

	M.E. MECHANICAL-AUTOMOBILE ENGINEERING SEMESTER – IV											
SURIECT					eme	Total		Eva	Total			
	L	Т	Ρ	Total	Cradit	Theory		IE	CIA	Pract.		
CODE NAME					Hrs	Credit	Hrs	Marks	Marks	Marks	Marks	Marks
MEAE401-N	Mid Semester Thesis Progress Review	-	I	-	-	5	-	-	-	50	150	200
MEAE402-N	MEAE402-N Dissertation Phase-II					20	-	-	-	100	200	300
	TOTAL	0	20	10	30	25	0	0	0	150	350	500

	SUBJECT	Teaching Scheme			eme	Tetel		Evaluation Scheme			Total		
	SUBJECT	L	Т	Р	Total	Crodit	Т	heory	IE	CIA	Pract.		
CODE	NAME	Hrs	Hrs	Hrs	Hrs	Credit	Hrs	Marks	Marks	Marks	Marks	Marks	
MEAE106-N-A /													
METH106-N-A	ADVANCED INTERNAL COMBUSTION ENGINE (ICW METH)	4	0	2	6	5	3	70	30	20	30	150	
MEAE106-N-B	INSTRUMENTATION & VEHICLE TESTING	4	0	2	6	5	3	70	30	20	30	150	
MEAE106-N-C	TWO & THREE WHEELERS	4	0	2	6	5	3	70	30	20	30	150	
	ELECTIV	E – II										-	
	SUBJECT	Te	achin	g Sch	eme	Total		Eva	luation	Total			
	565261	L	Т	Р	Total	Credit	Т	heory	IE	CIA	Pract.		
CODE	NAME	Hrs	Hrs	Hrs	Hrs	0.00.0	Hrs	Marks	Marks	Marks	Marks	Marks	
MEAE107-N-A /	ADVANCED THERMODYNAMICS & HEAT TRANSFER (ICW/ METH)												
METH102-N	ADVANCED THERMODITIANICS & HEAT TRANSFER (ICW METT)	4	0	2	6	5	3	70	30	20	30	150	
MEAE107-N-B	ELECTRIC & HYBRID SYSTEM	4	0	2	6	5	3	70	30	20	30	150	
MEAE107-N-C	QUALITY CONTROL & RELIABILITY ENGINEERING	4	0	2	6	5	3	70	30	20	30	150	
ELECTIVE – III													
	SUBJECT	Те	achin	g Sch	eme	Total		Eva	luation	Scheme		Total	
		L	Т	Р	Total	Credit	T	heory	IE	CIA	Pract.		
CODE	NAME	H	rs Hr	s Hi	s Hrs		H	s Marks	Mark	Marks	Mark	s Marks	
MEAE206-N-A	AUTOMOTIVE CHASSIS & BODY ENGINEERING	4	0	2	6	5	3	70	30	20	30	150	
MEAE206-N-B	HYDRAULIC AND PNEUMATIC SYSTEMS	4	0	2	6	5	3	70	30	20	30	150	
MEAE206-N-C	ADVANCED PRACTICE OF CAD SOFTWARE	4	0	2	6	5	3	70	30	20	30	150	
	ELECTIVI	E – IV											
	ELECTIV	E – IV Te	achin	g Sch	eme	Total	-	Eva	luation	Scheme		Total	
	ELECTIVE	E – IV Te L	achin T	g Sch P	eme Total	Total Credit	т	Eva heory	Iuation S	Scheme CIA	Pract.	Total	
CODE	ELECTIVE SUBJECT NAME	– IV Te L Hrs	achin T Hrs	g Sch P Hrs	eme Total Hrs	Total Credit	T Hrs	Eva heory Marks	luation S IE Marks	Scheme CIA Marks	Pract. Marks	Total Marks	
CODE MEAE207-N-A /	SUBJECT NAME ADVANCED AIR CONDITIONING (ICW METH)	E – IV Te L Hrs	achin T Hrs	g Sch P Hrs	eme Total Hrs	Total Credit	T Hrs	Eva heory Marks	Iuation S IE Marks	Scheme CIA Marks	Pract. Marks	Total Marks	
CODE MEAE207-N-A / METH206-N-B	ELECTIVE SUBJECT NAME ADVANCED AIR CONDITIONING (ICW METH)	E – IV Te L Hrs	achin T Hrs 0	g Sch P Hrs 2	eme Total Hrs 6	Total Credit	T Hrs 3	Eva heory Marks 70	Iluation IE Marks 30	Scheme CIA Marks 20	Pract. Marks	Total Marks	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B	ELECTIVE SUBJECT NAME ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING	- IV Te L Hrs	achin T Hrs 0 0	g Sch P Hrs 2 2	eme Total Hrs 6 6	Total Credit	T Hrs 3 3	Eva heory Marks 70 70	Iluation S IE Marks 30 30	CIA Marks 20 20	Pract. Marks 30 30	Total Marks 150 150	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C	ELECTIVE SUBJECT NAME ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS	- IV Te L Hrs 4	achin T Hrs 0 0 0	g Sch P Hrs 2 2 2	eme Total Hrs 6 6 6 6	Total Credit 5 5 5	T Hrs 3 3 3	Eva heory Marks 70 70 70 70	Iluation S IE Marks 30 30 30	CIA Marks 20 20 20 20	Pract. Marks 30 30 30	Total Marks 150 150 150	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C	ELECTIVE SUBJECT NAME ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS	E – IV Te L Hrs 4 4	achin T Hrs 0 0	g Sch P Hrs 2 2 2	eme Total Hrs 6 6 6	Total Credit 5 5 5	T Hrs 3 3 3	Eva heory Marks 70 70 70 70	Iluation S IE Marks 30 30 30 30	CIA Marks 20 20 20 20	Pract. Marks 30 30 30	Total Marks 150 150 150	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C	ELECTIVE SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE	E – IV Te L Hrs 4 4 4	achin T Hrs 0 0 0	g Sch P Hrs 2 2 2	eme Total Hrs 6 6 6 6	Total Credit 5 5 5	T Hrs 3 3 3	Eva heory Marks 70 70 70 70	Iluation S IE Marks 30 30 30	Scheme CIA Marks 20 20 20 20	Pract. Marks 30 30 30	Total Marks 150 150 150	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C	ELECTIVE SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT	E – IV Te L Hrs 4 4 4 E – V	achin T Hrs 0 0 0 0	g Sch P Hrs 2 2 2 g Sch	eme Total Hrs 6 6 6 6 6 eme	Total Credit 5 5 5	T Hrs 3 3 3	Eva heory Marks 70 70 70 70 Eva	Iluation S IE Marks 30 30 30	CIA CIA Marks 20 20 20 Scheme	Pract. Marks 30 30 30 30	Total Marks 150 150 150 Total	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C	ELECTIVE SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT NAME	E – IV Te Hrs 4 4 4 4 E – V Te L	achin T Hrs 0 0 0 0 0 achin	g Sch P Hrs 2 2 2 2 g Sch P Hrs	eme Total Hrs 6 6 6 6 6 eme Total	Total Credit 5 5 5 • Total Credit	T Hrs 3 3 3 3	Eva heory Marks 70 70 70 70 Eva heory	Iluation 1 IE Marks 30 30 30 30	Scheme CIA Marks 20 20 20 20 Scheme CIA	Pract. Marks 30 30 30 Pract.	Total Marks 150 150 150 Total	
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CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C CODE MEAE303-N-A MEAE303-N-A	ELECTIVE SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT SUBJECT VIERATION NOISE AND HARSHNESS CONTROL	E – IV Te L Hrs 4 4 4 4 E – V Te L Hrs 4 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4	achin T Hrs 0 0 0 0 0 0 achin T Hrs 0 0	g Sch P Hrs 2 2 2 2 2 g Sch P Hrs 2 2 2	eme Total Hrs 6 6 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Total Credit 5 5 5 5 Total Credit 5	T Hrs 3 3 3 3 3 7 Hrs 3 3	Eva heory Marks 70 70 70 Eva heory Marks 70 70	Iluation 3 IE Marks 30 30 30 30 Iluation 9 IE Marks 30 30	Scheme CIA Marks 20 20 20 20 Scheme CIA Marks 20 20	Pract. Marks 30 30 30 9 7 8 7 8 7 8 7 8 8 8 8 8 8 9 8 9 8 9 8	Total Marks 150 150 150 Total Marks 150	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C CODE MEAE303-N-A MEAE303-N-B MEAE303-N-B	ELECTIVE SUBJECT SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT SUBJECT VIBRATION NOISE AND HARSHNESS CONTROL EINUTE FLEMENT METHODS IN AUTOMOBILE ENGINEERING	E – IV Te Hrs 4 4 4 4 E – V Te E 4 4 4	achin T Hrs 0 0 0 0 0 achin T Hrs 0 0 0	g Sch P Hrs 2 2 2 2 2 2 g Sch P Hrs 2 2 2 2 2 2	eme Total Hrs 6 6 6 6 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Total Credit 5 5 5 5 Total Credit 5 5 5	T Hrs 3 3 3 3 3 1 1 Hrs 3 3 3 3	Eva heory Marks 70 70 70 Eva heory Marks 70 70 70	Iluation S IE Marks 30 30 30 30 Iluation S IE Marks 30 30 30	Scheme CIA Marks 20 20 20 20 Scheme CIA Marks 20 20 20	Pract. Marks 30 30 30 30 30 30 30 30 30 30 30 30 30	Total Marks 150 150 150 Total Marks 150 150	
CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C CODE MEAE303-N-A MEAE303-N-B MEAE303-N-C	ELECTIVE SUBJECT SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT SUBJECT SPECIAL PURPOSE VEHICLE VIBRATION NOISE AND HARSHNESS CONTROL FINITE ELEMENT METHODS IN AUTOMOBILE ENGINEERING	E – IV Te L Hrs 4 4 4 4 E – V Te L Hrs 4 4 4	achin T Hrs 0 0 0 0 0 0 Hrs 0 0 0 0 0	g Sch P Hrs 2 2 2 2 2 3 g Sch P Hrs 2 2 2 2 2 2	eme Total Hrs 6 6 6 6 Total Hrs 6 6 6 6	Total Credit 5 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 5 5 5 5 5 5 5 5	T Hrs 3	Eva heory 70 70 70 Eva heory Marks 70 70 70 70	Iluation S IE Marks 30 30 30 30 ILUation S IE Marks 30 30 30 30	Scheme CIA Marks 20 20 20 20 Scheme CIA Marks 20 20 20 20	Pract. Marks 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30	Total Marks 150 150 150 Marks 150 Total Marks 150 150	
CODE MEAE207-N-A / MEAE207-N-B MEAE207-N-C MEAE207-N-C CODE MEAE303-N-A MEAE303-N-B MEAE303-N-C	ELECTIVE SUBJECT SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT ELECTIVE SPECIAL PURPOSE VEHICLE VIBRATION NOISE AND HARSHNESS CONTROL FINITE ELEMENT METHODS IN AUTOMOBILE ENGINEERING UNIVERSITY ELE	E – IV Te L Hrs 4 4 4 4 4 L Hrs 4 4 4 4	achin T Hrs 0 0 0 0 0 achin T Hrs 0 0 0 0	g Sch P Hrs 2 2 2 2 2 2 9 Sch P Hrs 2 2 2 2	eme Total Hrs 6 6 6 6 Total Hrs 6 6 6 6 6 6 6 6 6 6 6 6 6	Total Credit 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Ti Hrs 3 3 3 3 There There <tr< td=""><td>Eva heory 70 70 70 Eva heory Marks 70 70 70 70</td><td>Iluation S IE Marks 30 30 30 30 ILUation S IE Marks 30 30 30 30</td><td>Scheme CIA Marks 20 20 20 20 Scheme CIA Marks 20 20 20 20</td><td>Pract. Marks 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30</td><td>Total Marks 150 150 150 Total Marks 150 150</td></tr<>	Eva heory 70 70 70 Eva heory Marks 70 70 70 70	Iluation S IE Marks 30 30 30 30 ILUation S IE Marks 30 30 30 30	Scheme CIA Marks 20 20 20 20 Scheme CIA Marks 20 20 20 20	Pract. Marks 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30	Total Marks 150 150 150 Total Marks 150 150	
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CODE MEAE207-N-A / METH206-N-B MEAE207-N-B MEAE207-N-C CODE MEAE303-N-A MEAE303-N-B MEAE303-N-B	ELECTIVE SUBJECT SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT ELECTIVE SPECIAL PURPOSE VEHICLE VIBRATION NOISE AND HARSHNESS CONTROL FINITE ELEMENT METHODS IN AUTOMOBILE ENGINEERING UNIVERSITY ELE	- IV Te L Hrs 4 4 4 E - V Te L Hrs 4 4 4 4 Te	achin T Hrs 0 0 0 0 achin T Hrs 0 0 0 0 0 0 0 0 0 achin	g Sch P Hrs 2 2 2 2 2 2 4 Hrs 2 2 2 2 2 2 1 9 5 ch	eme Total Hrs 6 6 6 7 0 6 6 6 6 6 6 6 6 6 6 6 6 6	Total Credit 5 5 5 7 7 7 7 7 7 7 7 7 7 5 5 5 7 7 7 7 7 7 7	T Hrs 3 3 3 3 T Hrs 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Eva heory 70 70 70 70 Eva heory Marks 70 70 70 70 70	Iluation 1 IE Marks 30 30 30 30 Iluation 1 IE Marks 30 30 30 30	Scheme CIA Marks 20 20 20 20 Scheme CIA Marks 20 20 20 20 20	Pract. Marks 30 30 30 30 30 30 30 30 30 30 30 30 30	Total Marks 150 150 150 Total Marks 150 150 150	
CODE MEAE207-N-A / MEAE207-N-B MEAE207-N-C MEAE207-N-C MEAE303-N-A MEAE303-N-A MEAE303-N-B MEAE303-N-C	ELECTIVE SUBJECT SUBJECT ADVANCED AIR CONDITIONING (ICW METH) AUTOMOTIVE MANUFACTURING ADVANCED AUTOMOTIVE AERODYNAMICS ELECTIVE SUBJECT ELECTIVE SPECIAL PURPOSE VEHICLE VIBRATION NOISE AND HARSHNESS CONTROL FINITE ELEMENT METHODS IN AUTOMOBILE ENGINEERING UNIVERSITY ELE	E – IV Te L Hrs 4 4 4 4 Hrs 4 4 4 4 CTIVI	achin T Hrs 0 0 0 0 m Hrs 0 0 0 0 0 0 0 achin T	g Sch P Hrs 2 2 2 2 3 8 Sch P Hrs 2 2 2 2 2 1 9 8 Sch P P Hrs 9 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	eme Total Hrs 6 6 6 7 0 6 6 6 6 6 6 6 6 6 6 7 0 1 1 1 1 1 1 1 1 1 1 1 1 1	Total Credit 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Thrs 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Eva heory 70 70 70 70 Eva heory Marks 70 70 70 70 70 20 Eva	Iluation 1 IE Marks 30 30 30 30 Iluation 1 IE Marks 30 30 30 30 30 30	Scheme CIA Marks 20 20 20 Scheme CIA Marks 20 20 20 20 Scheme CIA	Pract. Marks 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 9 Pract.	Total Marks 150 150 150 Total Marks 150 150 150	
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UNIVERSITY ELECTIVE SEM II												
		Te	achin	g Sch	eme	Total	al Evaluation Scher			cheme		
			Т	Р	Total	Credit	TH	IEORY	IE	CIA	Pract.	Total
CODE	SUBJECT NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
MECC201-N	Technical Communication	2	0	0	2	2	3	70	30	20	-	120
MECC202-N	Patent Search	2	0	0	2	2	3	70	30	20	-	120
MECC203-N	Engineering Ethics	2	0	0	2	2	3	70	30	20	-	120

ME MECHANICAL-AUTOMOBILE ENGINEERING SEMESTER-1

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Title: Research Methodology (University Elective)

	Teachin	g Schem	е							
L	т	Р	Total	Total Credit	Th	eory	IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
2	0	0	2	2	3	70	30	20	00	120

LEARNING OBJECTIVES

Subject Code: MECC101-N

The educational objectives of this course are

• To learn various concepts related to research methodology

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.

Total Hours (Theory): 30 Total Hours (Lab): 00 Total Hours: 30

DETAILED SYLLABUS

- 1. Introduction to the Research Methodology and research process at glance.
- 2. Discussion on Illustrative Research Proposals
- 3. Quantitative Research Design: Types of Research Designs and its applications
- 4. Identifying the Research Problem

- 5. Specifying Data and Acquisition Methods: Data types, Data source, Primary Data & Secondary Data, Comparison between various data actualization method.
- 6. Quantities Research design
- 7. Measuring and Scaling: Fundamentals and Comparative Scaling.: Commonly Used Scales in Business Research, Reliability and Validity of Scale
- 8. Research Paper Discussion: A Paper Contains Development and Validation of Scale
- 9. Questionnaire Designing: Steps in Designing Questionnaire, Pitfalls in Questionnaire Designing
- 10. Developing and Using Online Questionnaire
- 11. Sampling Design and Procedure: Sampling Method Procedure and Sample Size Decision
- 12. Define Research Question and Framing and Testing of Hypotheses: Developing the Hypothesis, Testing of Hypotheses: Type – I and II Errors, One Tailed and Two Tails Test of Significance. Parametric and Nonparametric Tests of Univariate and Bivariate Data(Nonparametric Tests: Kolmogorov Smirnov Test, Sign Test, Wilcoxon Matched Paris Test, Kolmogorov Smirnov Two Sample Test, Mann Whitey U Test)
- 13. Test of Association and Research Report writing: Regression (Introduction only), Preparing a Research Report and Communication the Research Result (Includes APA style of reporting the result referencing), Evaluation of Research Result
- 14. Statistical Package for Social Service(SPSS)

Sr.	Lecture	Course Content	Hrs.	Percentage
No	No			Weightage
1	1	Introduction to the Research Methodology and	1	
2	2	Introduction to research process at glance	1	
3	3	Discussion on Illustrative Research Proposals	1	
4	4	Quantitative Research Design	1	
5	5	Types of Research Design	1	
6	6	Research Designs and applications	1	
7	7	Identifying the Research Problem	1	
8	8	Specifying Data and Acquisition Methods:	1	50%
9	9	Data types, Data source,	1	50/0
10	10	Primary Data & Secondary Data,	1	
11	11	Comparison between various data actualization method	1	
12	12	Quantities Research design	1	
13	13	Measuring and Scaling: Fundamentals and Comparative	1	
		Scaling.:		
14	14	Commonly Used Scales in Business Research,	1	
15	15	Reliability and Validity of Scale	1	
16	16	Research Paper Discussion: A Paper Contains Development and	1	
		Validation of Scale		
17	17	Questionnaire Designing: Steps in Designing Questionnaire,	1	50%
		Pitfalls in Questionnaire Designing		5676
18	18	Developing and Using Online Questionnaire	1	
19	19	Sampling Design and Procedure: Sampling Method Procedure	1	

LESSON PLAN

		and	
20	20	Sample Size Decision	1
21	21	Define Research Question and Framing and Testing of	1
		Hypotheses:	
22	22	Developing the Hypothesis, Testing of Hypotheses: Type – I and	1
		II Errors, One Tailed	
23	23	Two Tails Test of Significance. Parametric and Nonparametric	1
		Tests of Univariate and Bivariate Data(Nonparametric Tests:	
24	24	Kolmogorov Smirnov Test, Sign Test, Wilcoxon Matched Paris	1
		Test, Kolmogorov Smirnov Two Sample Test, Mann Whitey U	
		Test)	
25	25	Test of Association	1
26	26	Research Report writing: Regression (Introduction only),	1
27	27	Preparing a Research Report	1
28	28	Communication the Research Result (Includes APA style of	1
		reporting the result referencing), Evaluation of Research Result	
29	29	Statistical Package for Social Service(SPSS)	1
30	30	Statistical Package for Social Service(SPSS)	1
		TOTAL Hrs. Required To complete Task	30

STUDENTS LEARNING OUTCOME

At the end of the course

The students will gain an experience in defining research problem, thesis writing, applying quantitative methods

TEXT BOOKS

- 1. Research Methodology: Methods & Techniques by C R Kothari, 2e, Wishwa Publication, New Delhi
- 2. Research Methodology by D K Bhattacharyya, 1 e, Excel Books, New Delhi, 2003

REFERENCE BOOKS

- 1. How to Research by Loraine Blaxter, Christina Hughes and Molcolm Tight, Viva Books Pvt. Ltd., New Delhi
- 2. Basic Communication Skills for Technology Andrea J Rutherford (Person)
- 3. Writing Your Thesis by Paul Oliver, Vistaar Pulication, New Delhi, 2006
- 4. The Research Student's Guide to Success by Pat Cryer, Viva Books Pvt Ltd., New Delhi
- 5. Technical Writing Process and Product Shron J. Gerson (Person)
- 6. Business Communication, Lesiker and Petit: MCGraw Hill Publications, 1995
- 7. Business Correspondence and Report Writing R.C. Sharma, Krishna Mohan (Tata McGraw)

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE102-N	Subject Title: Automobile Safety, Maintenance & Pollution Control
-	

	Teachin	g Schem	е							
L	т	Р	Total	Total Credit	The	eory	IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	0	4	4	3	70	30	20	00	120

LEARNING OBJECTIVES

The educational objectives of this course are

- To learn various concepts related to safety, maintenance & pollution control.
- To have detailed understanding of safety, maintenance & pollution principle to be applied in actual practice.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.

DETAILED SYLLABUS

Unit	Topics	Lectures	Weightage
No		(Hours)	(%)
1.	Engine Maintenance : Engine troubles, effects & remedies, different major & minor services for engine, inspection and	6	20%

			1
	checking of components visually and dimensionally, reconditioning methods of engine components, engine tune-up, special tools &		
	advanced equipments.		
2.	Chassis Dive-line Maintenance: Maintenance, repair and servicing of clutches, Fluid flywheel, gear boxes, Automatic transmission ,CVT unit, propeller shaft, differential unit,front axle and rear axle, suspension systems, servicing of brake systems- hydraulic, air systems, brake bleeding and brakes adjustments, maintenance and servicing of steering system-Manual & Power Steering system, wheel balancing, wheel alignment, maintenance of tyres, tyre rotation, frame defects, chassis frame alignment.	12	20%
3.	Maintenance, servicing of auxiliaries: Cooling system service, anti corrosion additives, anti freezing solutions, dry & wet liners, Petrol fuel and diesel fuel system maintenance, MPFI maintenance, lubrication system services, Chassis lubrication, lubrication chart, maintenance and care of storage batteries, battery testing methods, maintenance of ignition systems, tyre service & reconditioning.	12	20%
4.	Air Pollution due to Automobile Exhaust : Sources of Emission, Exhaust gas constituents & analysis, Ingredients responsible for air pollution, Smoke, odor, Smog formation, Sources of pollution, effects, Analysis of air pollutants, Air pollution control models and equipments.	12	10%
5.	Exhaust Emission Control: Basic method of emission control, catalytic converter, After burners, reactor manifold, air injection, crank case emission control, evaporative loss control, Exhaust gas recirculation, Fuel additives. Pollution Norms : European pollution norms, Indian pollution norms as per Central Motor Vehicle Rules (C.M.V.R.).Characteristics of solid waste, Potential methods of solid waste disposal, Energy recovery from municipal and Industrial solid waste.	8	10%
6.	Automobile Safety: Design of the body for safety, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction. active safety: driving safety, conditional safety, perceptibility safety, exterior safety, interior safety, deformation behavior of vehicle body, safety equipments seat belt, regulations, automatic seat belt tightener system, collapsible steering column, air bags, electronic system for activating air bags, bumper design for safety collision warning and avoidance collision warning system, causes of rear end collision, frontal object detection, comfort and convenience system of automobile.	10	20%
	Total	60	100%

LESSON PLANNING

Sr.	LECTURE NO	Course Content	Hrs.
No			
1	1	Engine Maintenance: Engine troubles, effects & remedies.	1
2	2	Different major & minor services for engine,	1
3	3	Inspection and checking of components visually and dimensionally	1
4	4	Reconditioning methods of engine components,	1
5	5	Engine tune-up,	1
6	6	Special tools & advanced equipments.	1
7	7	Maintenance, repair and servicing of clutches.	1
8	8	Repair and servicing of Fluid flywheel and gear boxes.	1
9	9	Automatic transmission	1
10	10	CVT unit, propeller shaft, differential unit, front axle and rear axle.	1
11	11	Suspension systems	1
12	12	Servicing of brake systems- hydraulic	1
13	13	Maintenance and servicing of steering system-Manual & Power Steering system	1
14	14	Wheel balancing, wheel alignment.	1
15	15	Maintenance of tyres, tyre rotation.	1
16	16	Air systems, brake bleeding and brakes adjustments	1
17	17	Frame defects	1
18	18	Chassis frame alignment.	1
19	19	Maintenance, servicing of auxiliaries.	1
20	20	Cooling system service, anti corrosion additives	1
21	21	Anti freezing solutions	1
22	22	Dry & wet liners	1
23	23	Petrol fuel and diesel fuel system maintenance,	1
24	24	MPFI maintenance	1
25	25	Lubrication system services,	1

26	26	Chassis lubrication,	1
27	27	lubrication chart, maintenance and care of storage batteries	1
28	28	Battery testing methods,	1
29	29	Maintenance of ignition systems	1
30	30	Tyre service & reconditioning.	1
31	31	Air Pollution due to Automobile Exhaust	1
32	32	Sources of Emission	1
33	33	Exhaust gas constituents	1
34	34	Exhaust gas constituents analysis	1
35	35	Ingredients responsible for air pollution	1
36	36	Smoke, odor	1
37	37	Smog formation	1
38	38	Sources of pollution,	1
39	39	Analysis of air pollutants	1
40	40	Air pollution control models	1
41	41	Effects of air pollutants	1
42	42	Air pollution control equipments.	1
43	43	Exhaust Emission Control:, catalytic converter, Energy recovery from municipal and Industrial solid waste.	1
44	44	After burners, reactor manifold, air injection	1
45	45	Evaporative loss control, Fuel additives	1
46	46	Pollution Norms : European pollution norms, Indian pollution norms as per Central Motor Vehicle Rules (C.M.V.R.).	1
47	47	Characteristics of solid waste,	1
48	48	Potential methods of solid waste disposal	1
49	49	Crank case emission control	1
50	50	Exhaust gas recirculation	1
51	51	Automobile Safety: Design of the body for safety.	1
52	52	Deceleration of vehicle inside passenger compartment.	1
53	53	Deceleration on impact with stationary and movable obstacle,	1

54	54	Concept of crumble zone, safety sandwich construction.	1
55	55	Active safety: driving safety, conditional safety, perceptibility safety, exterior safety, interior safety,	1
56	56	Deformation behavior of vehicle body, safety equipments seat belt, regulations, automatic seat belt tightener system,	1
57	57	Collapsible steering column, air bags, electronic system for activating air bags,	1
58	58	Bumper design for safety collision warning and avoidance collision warning system,	1
59	59	Causes of rear end collision, frontal object detection,	1
60	60	Comfort and convenience system of automobile.	1
		TOTAL Hrs. Required To complete Task	60

STUDENT LEARNING OUTCOME

- The student can identify different areas of Automobile maintenance and pollution control system.
- Can find the applications of all the areas in day to day life.

RECOMMANDED STUDY MATERIAL

Text & Reference Books:

- 1. Mechanics of Road Vehicles W. Steed, Illefe Books Ltd. London
- 2. Automotive Chassis P. M. Heldt, Chilton Co. NK
- 3. I.C. Engine Litchy
- 4. I.C. Engine Obert
- 5. Introduction to Internal Combustion Engines", Richard Stone, McMillan, London
- 6. Vehicle and Engine Technology Hein Heister
- 7. Advance Vehicle Technology Hein Heister
- 8. S. I. Engine Fuel Injection Development Charles A. Fisher, Chapman & Hall
- 9. Automotive Engines Herbert E. Ellinger
- 10. Automobile Engg. Volume I American Technical Society, Chicago
- 11. Internal Combustion Engines Fundamentals John B. Heyhood, McGraw Hill
- 12. Environmental Engineering, H.S.Peavy, D.R.Rowe, G.Tchobanoglous, McGraw-Hill Book Company, New York.
- 13. Introduction to Environmental Engineering and Science, G. Masters, Prentice-Hall International Editions.
- 14. Environmental Considerations in Energy Development, Asian Development Bank(ADB) Manila.
- 15. Bosch "Automotive Handbook" 5th edition SAE publication 2000.
- 16. J.Powloski "Vehicle Body Engineering" Business books limited, London 1969.
- 17. Ronald.K.Jurgen "Automotive Electronics Handbook" Second edition- McGraw-Hill Inc., 1999.

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE103-N	Subject Title: Vehicle Dynamics

Teaching Scheme					Scheme Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- To learn various concepts related to vehicle dynamics
- To have detailed understanding of vehicle dynamics principle to be applied in actual practice.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit	Topics	Lectures (Hours)	Weightage
1.	Suspension System - requirements types air suspension rubber	(nours)	(70)
	suspension Shock absorbers: compensated suspension systems:	c	200/
	design of leaf spring: coil spring and torsion har: types of drives-	6	20%
	Hotchkiss and torque tube.		
2	Wheel Alignments, wheel wohle: wheel shimmy: nitching:		
2.	bouncing and rolling: roll centre and roll axis: anti-roll bar: road	5	20%
	holding		
2	Handling Characteristics: Steering geometry: Eundamental		
5.	condition for true Bolling: Ackerman's Steering Gear: Davis Steering		
	gear: Steady state Handling: Neutral steer: Under steer and over	15	
	steer: Steedy state response: Yew velocity: Lateral Acceleration:		2004
	Curvature response & directional stability: jackknifing in articulated		20%
	vehicle: loading of automobile chassis due to road irregularities:		
	comfort criteria: load transferred while braking and cornering:		
	equivalent weight of vehicle		
4	Bide characteristics : Human response to vibrations: Single degree &		
	Two degree freedom: Free & Forced vibrations: Vehicle Ride Model:		
	Quarter car suspension model: Half car suspension model: Full car		
	suspension model: Two degree freedom model for sprung &	10	20%
	unsprung mass: Two degree freedom model for pitch & bounce:	13	20%
	Vibrations due to road roughness and engine unbalance:		
	Transmissibility of engine mounting: Motion of vehicle on		
	undulating road.		
5.	Stability of vehicles : Load distribution, calculation of tractive effort		
	and reactions for different drives, stability of a vehicle on a slope, on	6	20%
	a curve and a banked road.		
	Total	45	100%

LESSON PLANNING

Sr.	LECTURE	Course Content	Hrs.
No	NO		
1	1	SUSPENSION SYSTEM - requirements, types	1
2	2	Air suspension, rubber suspension,	1
3	3	Shock absorbers;	1

4	4	Compensated suspension systems;	1
5	5	Design of leaf spring; coil spring and torsion bar;	1
6	6	Types of drives-Hotchkiss and torque tube.	1
7	7	WHEEL ALIGNMENTS- wheel wobble; wheel shimmy	1
8	8	Pitching, bouncing and rolling	1
9	9	Roll centre and roll axis	1
10	10	Anti-roll bar	1
11	11	Road holding.	1
12	12	Handling Characteristics: Steering geometry	1
13	13	Fundamental condition for true Rolling	1
14	14	Neutral steer	1
15	15	Maintenance of tyres, tyre rotation	1
16	16	Ackerman's Steering Gear	1
17	17	Davis Steering gear	1
18	18	Steady state Handling	1
19	19	Under steer and over steer	1
20	20	Steady state response	1
21	21	Yaw velocity; Lateral Acceleration	1
22	22	Curvature response & directional stability	1
23	23	jackknifing in articulated vehicle	1
24	24	loading of automobile chassis due to road irregularities; comfort criteria	1
25	25	load transferred while braking and cornering	1
26	26	equivalent weight of vehicle	1
27	27	Ride characteristics: Human response to vibrations	1
28	28	Motion of vehicle on undulating road.	1
29	29	Transmissibility of engine mounting	1
30	30	Tyre service & reconditioning.	1
31	31	Single degree freedom	1
32	32	Two degree freedom	1

		TOTAL Hrs. Required To complete Task	45
45	45	Stability of a vehicle on a slope on a curve and a banked road.	1
44	44	Stability of a vehicle on a slope	1
43	43	Stability of a vehicle on a slope	1
42	42	Calculation of tractive effort and reactions for different drives	1
41	41	Calculation of tractive effort and reactions for different drives	1
40	40	Stability of vehicles: Load distribution,	1
39	39	Two degree freedom model for pitch & bounce	1
38	38	Two degree freedom model for sprung & unsprung mass	1
37	37	Full car suspension model	1
36	36	Half car suspension model	1
35	35	Quarter car suspension model	1
34	34	Vehicle Ride Model	1
33	33	Free & Forced vibrations	1

STUDENT LEARNING OUTCOME

At the end of the course

• The students will gain an experience in the implementation of vehicle dynamics concepts which are applied in the field of automobile.

LIST OF EXPERIMENTS

Sr.	Title	Lab Hrs.
No.		
1	Experiments based on suspension system.	04
2	Design of leaf spring used in suspension system.	04
3	Design of coil spring used in suspension system.	02
4	Experiment based on single degree and two degree freedom.	02
5	Experiment based on free and forced vibrations.	04
6	Experiments based on quarter, half and full car suspension system.	04

7	Experimental study of wheel alignments light weight motor vehicle.	02
8	Experimental study of tractive effort and reactions for different drives of automobile.	04
10	Stress analysis of ladder chassis frame in static condition.	04
	Total Hrs	30

RECOMMANDED STUDY MATERIAL

TEXT & REFERENCE BOOKS

- 1. Theory of Ground Vehicles J. Y. Woung John Willey & Sons, NY
- 2. Steering, Suspension & Tyres J. G. Giles, Ilete Books Ltd., London
- 3. Mechanics of Road Vehicles W. Steed, Ilete Books Ltd. London
- 4. Automotive Chassis P. M. Heldt, Chilton Co. NK
- **5.** Gillespie.T.D., "Fundamental of vehicle dynamic society of Automotive Engineers ",USA, 1992.
- 6. Vehicle dynamics and control by Rajesh Rajamani , Springer publication
- 7. Vehicle Dynamics : Theory and Application by Reza N Jazar, Springer publication

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject	Code: MEAE104-N	
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Subject Title: Advanced Automotive System

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- To learn various concepts related to advanced automotive system.
- To have detailed understanding of advanced automotive system principle to be applied in actual practice.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit No	Topics	Lectures (Hours)	Weightage (%)
1	Introduction: history and development, classification, terminology, future automobiles.	3	(/0)
2	Vehicle performance: power for propulsion, air resistance, rolling resistance, grade resistance, traction and tractive effort, relation between engine revolutions and vehicle speed, road performance curves, calculation of equivalent weight, gear ration for maximum acceleration, distribution of weight, stability of vehicle on slope and curved path, calculation of maximum acceleration, maximum tractive effort and reactions for different drive.	6	20%
3	Engine basic theory: Engine types and their operation, classification, Properties of I.C. engine fuels, actual cycle, air fuel cycle, combustion charts (equilibrium), two stroke engines, four stroke engine, characteristics of engines, air capacity of engine, valve timing diagram.	5	
4	Clutch and gear box: clutch: introduction, requirements of clutch, types, wet clutch, components of clutch housing, clutch operating linkages, fluid coupling, electro rheological fluid clutch, gear box: need and functions of gear box, types of gear boxes, basic devices used in overdrive, semi automatic and automatic transmission, principle of epicyclic gearing, torque converter, free wheel, overdrive, semi automatic and automatic transmission	5	20%
5	Drive line system: introduction, propeller shaft, universal coupling, final drive, differential assembly, rear axle, transfer of thrusts and reactions from the rear wheels to the chassis frame, types of drive, and special provisions in differential.	5	20%
6	Wheels and tyres: introduction, general definitions, types of wheel, wheel specifications, types of tyres, tread patterns, tyre specifications, inflation pressure and its effect, factors affecting the tyre performance, and special tyres.	5	

7.	Steering and suspension: Types of Front Axles and Stub Axles, wheel alignment, principle of correct steering, stability and geometrical consideration in steering Power Steering, four wheel steering system, speed responding power steering and special steering system. Suspension: introduction, types of springs used in suspension system, need for damping, and types of suspension system.	6	20%
8.	Brakes: braking fundamentals, work done in braking, braking efficiency, braking of vehicle, braking of vehicle on curved path introduction to ABS.	4	
9.	Electrical and electronic systems: Application of electricity in automobiles, starting, charging, lighting and accessory systems. Application of basic electronic components in automobiles.	4	20%
10.	Propulsion systems: Introduction to electric, hybrid and fuel cell vehicles.	2	
	Total	45	100%

LESSON PLANNING

Sr.	LECTURE	Course Content	Hrs.				
No	NO						
1	1	INTRODUCTION: history and development	1				
2	2	Classification, terminology	1				
3	3	Future automobiles.	1				
4	4 VEHICLE PERFORMANCE: power for propulsion, air resistance						
5	5 Rolling resistance, grade resistance,						
6	6 Traction and tractive effort,						
7	7 Relation between engine revolutions and vehicle speed,						
8	8	Distribution of weight, stability of vehicle on slope and curved path,	1				
		calculation of maximum acceleration,					
9	9	Maximum tractive effort and reactions for different drive.	1				
10	10	ENGINE BASIC THEORY: Engine types and their operation, classification.	1				
11	11	Properties of I.C. engine fuels, actual cycle	1				
12	12	Air fuel cycle, combustion charts (equilibrium)	1				
13	13	Two stroke engines, four stroke engine, characteristics of engines	1				
14	14	Air capacity of engine, valve timing diagram.	1				

15	15	Clutch and gear box: clutch: introduction, requirements of clutch, types,	1				
16	16	Clutch operating linkages, fluid coupling	1				
			-				
17	17	Electro rheological fluid clutch, gear box: need and functions of gear box, types of gear boxes	1				
18	18	Basic devices used in overdrive, semi automatic and automatic transmission, principle of epicyclic gearing, torque converter, free wheel	1				
19	19	Overdrive, semi automatic and automatic transmission	1				
20	20	Drive line system: introduction, propeller shaft, differential assembly	1				
21	21	Universal coupling, final drive	1				
22	22	Rear axle, transfer of thrusts					
23	23	23 Reactions from the rear wheels to the chassis frame					
24	24	24 Types of drive, and special provisions in differential					
25	25	25 Wheels and tyres: introduction, general definitions, types of wheel,					
26	26	26 Wheel specifications					
27	27	Types of tyres, tread patterns, tyre specifications	1				
28	28	Inflation pressure and its effect	1				
29	29	Factors affecting the tyre performance, and special tyres.	1				
30	30	Steering and suspension: Types of Front Axles and Stub Axles	1				
31	31	Wheel alignment	1				
32	32	Principle of correct steering, stability	1				
33	33	Geometrical consideration in steering Power Steering,	1				
34	34	Four wheel steering system, speed responding power steering and special steering system. Suspension: introduction,	1				
35	35	Types of springs used in suspension system, need for damping, and types of suspension system.	1				
36	36	Brakes: braking fundamentals, work done in braking	1				
37	37	Braking efficiency	1				
38	38	Braking of vehicle	1				
39	39	Braking of vehicle on curved path introduction to ABS.	1				
40	40	Electrical and electronic systems: Application of electricity in automobiles	1				
41	41	Starting, charging,	1				
42	42	Lighting and accessory systems.	1				

43	43	Application of basic electronic components in automobiles.	1
44	44	Propulsion systems: Introduction to electric	1
45	45	Hybrid and fuel cell vehicles.	1
		TOTAL Hrs. Required To complete Task	45

STUDENTS LEARNING OUTCOME

On successful completion of the course

- The student can identify different areas of advanced automotive system
- Can find the applications of all the areas in day to day life.

LIST OF PRACTICAL

Sr.	Title	Lab Hrs.
No.		
1	To study about layout and components of automobile.	02
2	Tutorials on vehicle performance and brake	04
3	Tutorials on valve timing diagram and variable specific heat	04
4	Demonstration and study of different clutches, its troubles and	02
	remedies.	
5	Demonstration and study of different types of gear boxes.	02
6	Demonstration and study of propeller shaft and driving axle.	04
7	Demonstration and study of suspension system.	02
8	Demonstration and study of wheels and tyres.	02
9	Demonstration and study of steering system.	02
10	Demonstration and study of different types of brake.	02
11	Seminar: Recent trends in automobile	04
	Total Hrs	30

TEXT BOOKS

- 1. Automobile Engineering Vol-1 by Kirpal Singh
- 2. Automobile Engineering Vol-1 byK.M.Gupta vol-1 and 2
- **3.** Automobile Engineering R BGupta

REFERENCE BOOKS

- 1. Steed W., " Mechanics of Road vehicles ", Illiffe Books Ltd., London.
- 2. Newton Steeds & Garrot, "Motor vehicles", Butterworths, London.
- **3.** Judge A.W., " Mechanism of the car ", Chapman and Halls Ltd., London.
- **4.** Giles.J.G., "Steering, Suspension and tyres ", Iliffe Book Co., London.
- 5. Crouse W.H., " Automotive Chassis and Body ", McGraw Hill. Newyork
- 6. Heldt P.M., " Automotive chassis ", Chilton Co., New York

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE105-N	Subject Title: Seminar-1

	Teachin	g Scheme	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
0	0	2	2	1	-	-	-	60	100	160

LEARNING OBJECTIVES

The educational objectives of this course are

- To present a problem oriented in depth knowledge of Seminar
- To address the underlying concepts and methods behind Seminar

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Attendance is compulsory in laboratory, which may carries 10 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 20 marks in the overall internal evaluation.
- Surprise Quizzes/Seminar may be conducted and having share of 30 marks in the overall internal evaluation.
- Viva Voce will be conducted at the end of the semester of 100 Marks.

Total Hours (Theory): 00 Total Hours (Lab): 30 Total Hours: 30

DETAILED SYLLABUS

Students will do literature review and prepare a project report on relevant topic and give the presentation.

STUDENTS LEARNING OUTCOME

On successful completion of the course

- The student can identify different areas of of Seminar
- Can find the applications of all the areas in day to day life

ME MECHANICAL-AUTOMOBILE ENGINEERING DEPARTMENT ELECTIVE-I

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE106-N-A /	Subject Title: Advanced Internal Combustion Engine (ICW METH)
METH106-N-A	

	Teachin	g Scheme	е		Evaluation Scheme					
L	Т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- The educational objectives of this course are
- To develop in students and understand the actual combustion phenomena of engine.
- To develop ideas for engine modification & expose those ideas in real world for optimization of the technology.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Unit	Topics	Lectures	Weightage
No		(Hours)	(%)
1	Review: Thermodynamic cycles: ideal, fuel – air and real cycles. I.C		
	engine Processes: Suction, compression, Combustion, Expansion, Fuel	4	8%
	injection and carburetion, Exhaust, Supercharged & turbocharged		
	engine, cycle simulation.		
2	Gas exchange processes: Flow through valves, phase of the flow,	8	12%
	turbulence, analysis of suction and exhaust processes, manifold tuning.		
3	Alternate fuels for IC engines: Fuels & their properties, future fuels like		
	Hydrogen, Bio gas, Alcohols, producer gas, LPG, CNG- fuels rating Coal-	10	2.00/
	gasification & liquefaction, Non edible vegetable oils, non edible wild oil,	12	20%
	NH_3 as substitute fuel for SI and CI engine, fuel additives. Pros and cons		
	of alternate fuel.		
4	Combustion in SI and CI engine: Combustion of SI and CI engine, Normal		
	and abnormal combustion parameters effecting various phases of	12	20%
	combustion, Combustion chambers, construction and design, Battery,		
	magneto electronic- ignition system in SI engine, Volumetric efficiency.		
5	Recent development in IC engine: MPFI, their advantages & limitations,		
	circuit discussion PIV in turbulence measurement, optical methods for		
	flame velocity measurement, new materials for engine components,	40	2001
	alternative power plants, improved two stroke engine, hybrid,	12	20%
	propulsion system, Fuel efficient IC engines, emission control		
	technology emission, economics and performance for alternative fuels		
	for IC engines.		
6	Air-pollution from I.C. Engines: S.I. & C.I. Engine Emission effects of		
	pollutants on Human health & Biological sphere. Measurement	10	200/
	techniques used to measure pollutants. Control of emission from S.I. &	12	20%
	C.I. engines, Noise pollution & its control. Catalytic converters, Pollution		
	law.		
	Total	60	100%

LESSON PLANNING

Sr.	Lecture No	Course Content	
NO			
1	1	Review- thermodynamic cycles: ideal, fuel – air and real cycles	1
2	2	I.C engine Processes: Suction, compression	1
3	3	Combustion, Expansion, Fuel injection and carburetion, Exhaust	1
4	4	Supercharged & turbocharged engine, cycle simulation	1
5	5	Gas exchange processes: Introduction	1

6	6	Flow through valves	1
7	7	Phase of the flow, turbulence,	1
8	8	Phase of the flow, turbulence,	1
9	9	Analysis of suction and exhaust processes	1
10	10	Analysis of suction and exhaust processes	1
11	11	Manifold tuning	1
12	12	Manifold tuning	1
13	13	Alternate fuels for IC engines: Fuels & their properties	1
14	14	Future fuels like	1
15	15	Hydrogen, Bio gas, Alcohols	1
16	16	Producer gas, LPG	1
17	17	CNG- fuels rating Coal	1
18	18	Gasification & liquefaction	1
19	19	Non edible vegetable oils	1
20	20	Non edible wild oil	1
21	21	NH ₃ as substitute fuel for SI and CI engine	1
22	22	NH ₃ as substitute fuel for SI and CI engine	1
23	23	Fuel additives.	1
24	24	Pros and cons of alternate fuel.	1
25	25	Combustion in SI and CI engine: Introduction	1
26	26	Combustion of SI	1
27	27	Combustion of CI engine	1
28	28	Normal combustion	1
29	29	Normal combustion	1
30	30	Abnormal combustion parameters effecting various phases of combustion	1
31	31	Abnormal combustion parameters effecting various phases of combustion	1
32	32	Combustion chambers	1
33	33	Construction and design, Battery	1
34	34	Magneto electronic	1
35	35	Ignition system in SI engine	1
36	36	Volumetric efficiency	1
37	37	Recent development in IC engine: MPFI, their advantages & limitations	1
38	38	Optical methods, circuit discussion PIV in turbulence measurement	1
39	39	Flame velocity measurement	1
40	40	New materials for engine components	1
41	41	Alternative power plants	1
42	42	Improved two stroke engine	1
43	43	Hybrid	1
44	44	Propulsion system	1
45	45	Fuel efficient IC engines	1
46	46	Emission control technology emission	1
47	47	Economics and performance	1
48	48	Alternative fuels for IC engines	1
49	49	Air-pollution from I.C. Engines: Introduction	1
50	50	S.I. Engine effects	1

51	51	C.I. Engine effects	1
52	52	Emission effects of pollutants on Human health & Biological sphere	1
53	53	Emission effects of pollutants on Human health & Biological sphere	1
54	54	Measurement techniques used to measure pollutants	1
55	55	Measurement techniques used to measure pollutants	1
56	56	Control of emission from S.I	1
57	57	C.I. engines	1
58	58	Noise pollution & its control	1
59	59	Catalytic converters	1
60	60	Pollution law	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL

Sr.	Title	Lab Hrs.
No.		
1	Assignment: Basics of I C Engine	2
2	To analyze performance of I C Engine.	2
3	To analyze emission of I C Engine.	2
4	To determine optimum Injection Pressure in single cylinder diesel engine by	4
	varying the Injection Pressure.	
5	To analyze Combustion of I C Engine.	4
6	To determine optimum Compression Ratio in single cylinder diesel engine	4
	by varying the Compression Ratio.	
7	To check operation and performance of multi cylinder fuel pump for diesel	4
	engine with the help of fuel pump test bench.	
8	Assignments: Combustion of I C Engine	4
9	Assignments: Alternative fuel	2
10	Assignments: Advanced in Materials for I C Engine components	2
	Total	30

STUDENTS LEARNING OUTCOME

On successful completion of the course

- The student can identify different areas of Advanced Internal Combustion Engine.
- Can find the applications of all the areas in day to day life.

TEXT BOOKS & REFERENCE BOOKS

1. Maleev, "I. C. Engines: Theory and Practice", McGraw -Hill-2000.

- 2. Heywood, J. B., "Internal Combustion Engine Fundament als", McGraw Hill International Edition, 2002.
- Richard, Stone, "Introduction to Internal Combustion Engines", 2nd Edn. McMillan Press, 2003.
- 4. Taylor, C. F., "Internal Combustion Engine in Theory and Practice", Vol. 1 & 2, M. I. T. Press, Cambridge, USA,2003.
- 5. Juvinall, R. C., and Marshek, K. M., "Fundamental of Machine Component Design", John Wiley & Sons, N.Y.,2001.

WEB MATERIALS

- http://www.wikipedia.org
- http://nptel.ac.in
- http://ocw.mit.edu
- http://www.catool.org

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code, MEAEIOG N P	Subject Titley Instrumentation And Vahiele Testing
Subject Code. MEAE100-N-D	Subject fille. Instrumentation And vehicle resting

Teaching Scheme					Eva	luation Sc	heme			
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs Marks		Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- The student can identify different areas of instrumentations and vehicle testing
- The students can find the applications of all the areas in day to day life.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit	Topics	Lectures	Weightage
No		(Hours)	(%)
1	Planning and Measurement; Instrumentation; Selection of measuring instrument; requirements of measurement such as precision, accuracy, errors, sensitivity, readability and reliability; Measurement of thermo- physical properties; Devices to measure temperature and pressure of the working fluid, coolant, air and fuel flow into the engine.	12	20%
2	Indicating and recording instruments; Vibrometer; Accelerometer; vibration and pressure pickups; vibration test methods; Counters; stroboscopes; charge amplifiers; cathode ray oscillo graphs; FFT analyzer.	12	20%
3	Warning and alarm instruments; Brake actuation warning system; traficators; flashsystem; oil pressure warning system; engine over heat warning system; air pressure warning system; speed warning system; door lock indicators; gear neutral indicator; horn design; permanent magnet horn; air & music horns; safety air bag and latest developments.	12	20%
4	Data acquisition and processing: General data acquisition system examples, storage; processing, recording and display devices.	12	20%
5	ISI codes for testing automotive engines; Laboratory dynamometer testing systems of power train and vehicle under simulated conditions; Instrumentation for testing vehicles; road test of automobile vehicles; wheel alignment; balancing; PUC test of vehicles; preparation of test reports, EURO standards, Bharat stages.	12	20%
	Total	60	100%

LESSON PLANNING

Sr.	Lecture	Course Content	
No	No		
1	1	Planning and Measurement	1
2	2	Instrumentation	1
3	3	Selection of measuring instrument	1
4	4	Requirements of measurement such as precision	1
5	5	Accuracy, errors, sensitivity	1
6	6	Readability and reliability	1
7	7	Measurement of thermo-physical properties	1
8	8	Measurement of thermo-physical properties	1

9	9	Devices to measure temperature and pressure of the working fluid	1
10	10	Devices to measure temperature and pressure of the working fluid	1
11	11	Coolant	1
12	12	Air and fuel flow into the engine	1
13	13	Indicating and recording instruments	1
14	14	Vibrometer	1
15	15	Accelerometer	1
16	16	Vibration and pressure pickups	1
17	17	Vibration and pressure pickups	1
18	18	Vibration test methods; Counters	1
19	19	Stroboscopes	1
20	20	Charge amplifiers	1
21	21	Cathode ray oscillo graphs	1
22	22	Cathode ray oscillo graphs	1
23	23	FFT analyzer	1
24	24	FFT analyzer	1
25	25	Warning and alarm instruments	1
26	26	Brake actuation warning system; traficators	1
27	27	Flashsystem	1
28	28	Oil pressure warning system	1
29	29	Engine over heat warning system	1
30	30	Air pressure warning system	1
31	31	Speed warning system	1
32	32	Door lock indicators	1
33	33	Gear neutral indicator; horn design	1
34	34	Permanent magnet horn	1
35	35	Air & music horns	1
36	36	Safety air bag and latest developments	1
37	37	Data acquisition and processing	1
38	38	General data acquisition system	1
39	39	General data acquisition system	1
40	40	Examples	1
41	41	Examples	1
42	42	Examples	1
43	43	Storage; processing	1
44	44	Storage; processing	1
45	45	Storage; processing	1
46	46	Recording and display devices	1
47	47	Recording and display devices	1
48	48	Recording and display devices	1
49	49	ISI codes for testing automotive engines	1
50	50	Laboratory dynamometer testing systems of	1
		Power train and	
51	51	Vehicle under simulated conditions	1
52	52	Instrumentation for testing vehicles;;;;,	1
----	----	---	----
53	53	Road test of automobile vehicles	1
54	54	Wheel alignment; balancing	1
55	55	PUC test of vehicles	1
56	56	Preparation of test reports	1
57	57	EURO standards	1
58	58	EURO standards	1
59	59	Bharat stages.	1
60	60	Bharat stages.	1
		TOTAL Hrs. Required To complete Task	60

STUDENT LEARNING OUTCOME

- The student can identify different areas of instrumentations and vehicle testing
- Can find the applications of all the areas in day to day life.

LIST OF PRACTICAL

Sr.	Title	Lab Hrs.		
No.				
1	To study and perform temperature and pressure measurement on coolant	2		
	circuit and lubrication oil circuit of automobile.			
2	To study and perform measurement of flow of flow of coolant and	4		
	lubrication oil circuit.			
3	To study the velocity of smoke and fresh air and flow measurement.	4		
4	To analyze the smoke with gas analyzer with PUC setup.			
5	To measure the rpm of propeller shaft and axle with stroboscope and	4		
	tachometer.			
6	To align and balance the wheels of automobile.	4		
7	To check the brake effort with rope brake dynamometer.	4		
8	To analyze the vibrations with the help of FFT analyzer and vibrometer.	4		
	Total	30		

RECOMMANDED STUDY MATERIAL

- 1. Engineering Experimentation Ernest O. Doeblin
- 2. Experimental Methods for Engineers Holman J.P., McGraw Hill Book Co.
- 3. Measurement Systems, Applications & Design Ernest O Doeblin, McGraw Hill BookCo.
- 4. Modern Electric Equipments for Automobiles Judge A. W., Chapman Hall, London
- 5. Applied Instrumentation in Process Industries Andrews W. G.

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Title: Two And Three Wheelers

	Teachin	g Scheme	9			Eva	aluation So	heme		
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

Subject Code: MEAE106-N-C

- The educational objectives of this course are
- To develop students two and three wheeler technology for developing of concepts, ideas and design of engineering products and expose them to existing related technology.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Unit No	Topics	Lectures (Hours)	Weigtage (%)
1	Introduction: Development history of two & three wheeler vehicles. Classification & layouts of two wheelers (motorcycles, scooters, mopeds) and Three wheelers vehicles (by applications – goods/passengers, carriage capacity). Study of technical specification of Two & Three wheelers.	4	05%
2	Power Plant : Selection criteria and Design considerations for two wheeler & three wheeler power plants (Engine). Systems requirements for Engine lubrication, cooling & starting (Kick starter mechanism, Moped cranking mechanism & Button Start mechanism). Recent developments in engine (2 stroke/4 storke engines, Fuel used – Gasoline, CNG, Diesel AND high powered engine), Electric Vehicles.	8	15%
3	Transmission Systems: Clutch – special requirements, different types used in two & three wheelers. Need of primary reduction, selection of transmission - gear box, gear shift mechanism, Chain OR belt drive system for transmission of torque to drive wheels, automatic transmission (Continuously Variable Transmission - CVT, Epicyclic gear train), arrangement of final drive & differential for three wheeler.	8	15%
4	Steering & Suspension : Steering system arrangement for two & three wheelers, steering column construction, steering geometry, Suspension requirements, design considerations, trailing & leading link, swinging arm, springs & shock absorbers.	8	15%
5	Brake, Wheels & Tyres: Design consideration of brake, types of brakes – disc, drum and braking mechanism – mechanical, hydraulic & serv. Hand operated or Foot operated barkes. Wheel types – spokes construction, alloy wheels, pressed wheel disc or split wheel disc. Types of tyres for two & three wheelers.	9	16%
6	Frame & Body : Types of frame, construction, loads, design consideration, materials, Types of three wheeler bodies, layout, RTO regulations, aerodynamic, aesthetic & ergonomics considerations for body work, side car.	9	16%
7	Electrical Systems & Instruments: Battery specifications, Charging system, Lighting (front & rear), Ignition key switch, Horn, Side Signaling, Instruments & Indicators.	6	08%
8	Two & three wheeler Maintenance: Preventive & brake down maintenance, factors affecting fuel economy & emission.	8	10%
	Total	60	100%

LESSON PLANE

Sr.	Lecture No	Course Content	Hrs.
No			
1	1	Introduction Development history of two & three wheeler vehicles.	1
2	2	Classification & layouts of two wheelers (motorcycles, scooters, mopeds)	1
3	3	Three wheelers vehicles (by applications – goods/passengers, carriage capacity).	1
4	4	Study of technical specification of Two & Three wheelers.	1
5	5	Power plant :	1
		Selection criteria and design considerations for two wheeler	
6	6	Three wheeler power plants (Engine).,	1
7	7	Systems requirements for Engine lubrication	1
8	8	Cooling & starting (Kick starter mechanism	1
9	9	Moped cranking mechanism & Button Start mechanism).,	1
10	10	Recent developments in engine (2 stroke/4 storke engines, Fuel used – Gasoline	1
11	11	CNG, Diesel AND high powered engine),	1
12	12	Electric vehicles.	1
13	13	Transmission systems: clutch	1
14	14	Special requirements	1
15	15	Different types used in two & three wheelers. Need of primary reduction	1
16	16	Selection of transmission - gear box, gear shift mechanism	1
17	17	Selection of transmission - gear box, gear shift mechanism	1
18	18	Chain OR belt drive system for transmission of torque to drive wheels	1
19	19	Automatic transmission (Continuously Variable Transmission - CVT, Epicyclic gear train)	1
20	20	Arrangement of final drive & differential for three wheeler	1
21	21	Steering & suspension :	1
		Steering system arrangement for two & three wheelers	
22	22	Steering column construction	1
23	23	Steering geometry	1
24	24	Suspension requirements	1
25	25	Design considerations	1
26	26	Trailing & leading link	1
27	27	Swinging arm,	1
28	28	Springs & shock absorbers.	1
29	29	Brake, wheels & tyres:	1
20	20	Design consideration of brake	
30	30	Types of brakes – disc	1
31	31	Drum and braking mechanism – mechanical	1
32	32	Hydraulic & serv	1
33	33	Hand operated or Foot operated barkes	1
34	34	wheel types – spokes construction	1
35	35	Alloy wheels	
36	36	Pressea wheel disc or split wheel disc.	1
37	37	Types of tyres for two & three wheelers.	1
38	38	Frame & body :	1

		Types of frame, construction, loads	
39	39	Design consideration, materials	1
40	40	Types of three wheeler bodies, layout	1
41	41	RTO regulations	1
42	42	Aerodynamic	1
43	43	Aesthetic	1
44	44	Ergonomics considerations for body work	1
45	45	Ergonomics considerations for body work	1
46	46	Side car	1
47	47	Electrical systems & instruments:	1
		Battery specifications	
48	48	Charging system, Lighting (front & rear)	1
49	49	Ignition key	1
50	50	Switch, Horn	1
51	51	Side signaling	1
52	52	Instruments & indicators	1
53	53	Two & three wheeler Maintenance: introduction	1
54	54	Preventive	1
55	55	Brake down maintenance	1
56	56	Brake down maintenance	1
57	57	Factors affecting fuel economy	1
58	58	Factors affecting fuel economy	1
59	59	Emission	1
60	60	Emission	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL

Sr.	Title	Lab
No.		Hrs.
1	Draw and study about layout of two and three wheeler vehicles.	2
2	Study of technical specification of two and three wheelers.	2
3	Two wheeler chain test	2
4	Two wheeler Brake and Clutch adjustment as per specification.	4
5	Dismantling and assembling of two wheeler gear box and finding gear ratios	4
6	Dismantling and assembling of three wheeler box and finding gear ratios	4
7	Three wheeler brake and clutch play adjustment	4
8	Dismantling and assembling of three wheeler steering system.	4
9	Study of three wheeler chassis frame and power transmission system.	4
	Total	30

STUDENTS LEARNING OUTCOME

On successful completion of the course

- Be able to understand fundamentals of subject
- Be able to interpret theoretical knowledge with practical application.
- Be able to produce new concept in engineering.

TEXT BOOKS

- 1. Newton Steed, "The Motor Vehicle", McGraw Hill Book Co. Ltd., New Delhi
- 2. Siegfried Herrmann, "The Motor Vehicle", Asia Publishing House, Bombay.

REFERENCE BOOKS

- 1. "Two stroke Motor Cycles", Staff & Motor Cycles, London llefe Books.
- 2. G.B.S. Narang, "Automobile Engineering", 5th Edition, Khanna Publishers, Delhi.
- 3. Service Manuals of Manufacturers of Indian Two & Three wheelers.
- 4. Irving. P. E., "Motor Cycle Engineering", Temple Press Book, London 1992.
- 5. "The Cycle Motor Manual",- Temple Press Limited, London 1990.
- 6. Raymond Broad Lambretta, "A Practical Guide to maintenance and repair", S.Chand & Co., New Delhi 1987.

WEB MATERIALS

• http://www.wikipedia.org

ME MECHANICAL-AUTOMOBILE ENGINEERING DEPARTMENT ELECTIVE-II

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

1st Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE107-N-A /	Subject Title: ADVANCED THERMODYNAMICS & HEAT TRANSFER (IN
METH102-N	COMMON WITH METH)

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Th	eory	IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- To present a problem oriented in depth knowledge of Advanced Thermodynamics and heat transfer
- To address the underlying concepts and methods behind Advanced Thermodynamics and heat transfer

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Unit	Topics	Lectures	Weightage
1.	Concept of Exergy and Entropy: Exergy for closed system: Entropy	(Hours)	(%)
	generation; entropy balance for closed system; behavior of gases;	8	20%
2.	Phase equilibrium; phase rule without chemical reaction; chemical potential of ideal gases; T-ds equations for simple compressible systems; Helmholtz and Gibbs functions; Maxwell relations; generalized relations for changes in enthalpy; entropy and internal energy; equations for specific heats; Clausius clapeyron equation; Joule-Thomson and Joule coefficients; applications of thermodynamic relations	14	20%
3.	Review of the basic laws of conduction ; One dimensional steady state conduction with variable thermal conductivity and with internal distributed heat source; Extended surfaces-review and design considerations; Two dimensional steady state conduction; Unsteady state conduction; solutions using Groeber's and Heisler's charts for plates, cylinders and spheres suddenly immersed in fluids.	14	20%
4.	Review of convection heat transfer laws , Natural and forced convection; Heat transfer in turbulent flow; eddy heat diffusivity; Reynold's analogy between skin friction and heat transfer; von Karman; turbulent flow through circular tubes	14	20%
5.	Review of radiation heat transfer laws and principles ; diffuse surfaces and the Lambert's Cosine law; Radiation through non-absorbing media; Hottel's method of successive reflections.	10	20%
	Total	60	100%

LESSON PLANNING

Sr.	LECTURE	Course Content	Hrs.
No	NO		
1	1	Concept of Exergy and Entropy; behavior of gases;	1
2	2	Exergy for closed system;	1
3	3	Entropy generation;	1
4	4	Entropy balance for closed system;	1
5	5	Entropy balance for closed system;	1
6	6	Equations of state.	1
7	7	Equations of state.	1

8	8	Equations of state.	1
9	9	Phase equilibrium	1
10	10	Phase rule without chemical reaction	1
11	11	Maxwell relations	1
12	12	Chemical potential of ideal gases	1
13	13	Chemical potential of ideal gases	1
14	14	T-ds equations for simple compressible systems	1
15	15	T-ds equations for simple compressible systems	1
16	16	Helmholtz and Gibbs functions;	1
17	17	Generalized relations for changes in enthalpy	1
18	18	Entropy and internal energy;	1
19	19	Equations for specific heats	1
20	20	Clausius clapeyron equation	1
21	21	Joule-Thomson and Joule coefficients	1
22	22	Applications of thermodynamic relations	1
23	23	Review of the basic laws of conduction; One dimensional steady state conduction with variable thermal conductivity and with internal distributed heat source:	1
24	24	One dimensional steady state conduction with variable thermal	1
25	25	Conductivity and with internal distributed heat source; One dimensional steady state conduction with variable thermal	1
26	26	Golutions using Groeber's and Heisler's charts for plates	1
27	27	Golutions using Groeber's and Heisler's charts for plates	1
28	28	Extended surfaces-review and design considerations;	1
29	29	Extended surfaces-review and design considerations;	1
30	30	Extended surfaces-review and design considerations;	1
31	31	Two dimensional steady state conduction;	1
32	32	Unsteady state conduction;	1
33	33	Solutions using Groeber's and Heisler's charts for plates,	1
34	34	Solutions using Groeber's and Heisler's charts for plates,	1
35	35	Cylinders and spheres suddenly immersed in fluids.	1
36	36	Cylinders and spheres suddenly immersed in fluids.	1

37	37	Review of convection heat transfer laws,	1					
38	38	Turbulent flow through circular tubes	1					
39	39	Turbulent flow through circular tubes	1					
40	40	Turbulent flow through circular tubes	1					
41	41	Natural and forced convection;	1					
42	42	Natural and forced convection;						
43	43	Natural and forced convection;						
44	44	Heat transfer in turbulent flow;	1					
45	45	Eddy heat diffusivity;	1					
46	46	Reynold's analogy between skin friction and heat transfer;	1					
47	47	Reynold's analogy between skin friction and heat transfer;	1					
48	48	Von karman;	1					
49	49	9 Turbulent flow through circular tubes						
50	50	50 Turbulent flow through circular tubes						
51	51	Review of radiation heat transfer laws and principles;;;	1					
52	52	Diffuse surfaces and the Lambert's Cosine law	1					
53	53	Diffuse surfaces and the Lambert's Cosine law	1					
54	54	Radiation through non-absorbing media	1					
55	55	Radiation through non-absorbing media	1					
56	56	Radiation through non-absorbing media	1					
57	57	Hottel's method of successive reflections.	1					
58	58	Hottel's method of successive reflections.	1					
59	59	Hottel's method of successive reflections.	1					
60	60	Hottel's method of successive reflections.	1					
		TOTAL Hrs. Required To complete Task	60					

LIST OF EXPERIMENTS

Sr. No.	Title	Lab Hrs.
1	Conduction heat transfer in composite wall.	04
2	Conduction heat transfer in metal rod.	04

3	Conduction heat transfer in through insulating powder.	02
4	Conduction heat transfer from a Pin fin.	02
5	Convection heat transfer in forced convection.	04
6	To study unsteady state heat transfer by the lumped capacitance	04
7	To study of heat transfer in the process of condensation.	02
8	To determine the value of Stefan Boltzmann constant for radiation	04
	heat transfer.	
10	To measure the emissivity of test plate.	04
	Total Hrs	30

STUDENTS LEARNING OUTCOME

On successful completion of the course

- The student can identify different areas of Thermodynamics and Heat Transfer.
- Can find the applications of all the areas in day to day life.

TEXT BOOKS

- **1.** Fundamentals of Engineering Thermodynamics, Moran MJ & Shapiro HM, John Wiley,
- 2. Engineering Thermodynamics work and heat Transfer, Roger Gordon & Yon Mayhew, Addison-Wesley, 2001
- 3. Thermodynamics an Engineering Approach, Cengel Y.A. & Boles M.A., TMH.

REFERENCE BOOKS:

- 1. Fundamentals of Classical Thermodynamics, Van Wylen GJ & S onntag RE, Wiley 2
- 2. Thermodynamics, Wark K. Jr. & Donald E.R., McGraw Hill (6th Edn.); 1999.
- **3.** Fundamentals of Heat Transfer, Encropera
- 4. Heat, Mass and Momentum transfer, Rohsenow and Choi Prentice Hall
- 5. Fundamentals of Heat Transfer, Grober, Erk and McGraw Hill Grigull
- 6. Analysis of Heat and Mass Transfer, Eckert and Drake McGraw Hill
- 7. Thermal Radiation, Siegel and Howell McGraw Hill.
- 8. Engineering Thermodynamics by Jones & Dugan
- 9. Engineering Thermodynamics by P. K. Nag
- **10.** Basic Engineering Thermodynamics by T Ray chaudhary
- **11.** Fundamentals of Engineering thermodynamics, R. Yadav.
- **12.** Advanced thermodynamics Engineering, KalyanAnnamalai&Ishwar K Puri, CRC Press.
- 13. Heat and Mass Transfer, R.K.Rajput
- 14. Heat and Mass Transfer, D.S.Kumar
- **15.** Handbook of Thermal Engineering, Kreith F

WEB MATERIALS

- www.sciencedirect.com ,
- www.ocw.mit.edu,nptl.ac.in

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code:	MEAE107N-B	Sub
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Subject Title: Electric And Hybrid System

	Teachin	g Scheme	}		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

 To develop in student's electric and hybrid vehicles for developing of concepts, ideas and design of engineering products and expose them to existing national standards related to technology.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit No	Topics	Lectures (Hours)	Weigtage (%)
1	Introduction: Air pollution and global warming. Impact of different transportation technologies on environment and energy supply. History of hybrid electric, electric and fuel cell vehicles.	8	9%
2	Electric Vehicles: Electric vehicles configuration Energy and power requirements for various HEVs and EVs Vehicle performance and driving cycles.	8	15%
3	Hybrid Electric Vehicles: Fundamentals of hybrid electric vehicles Series hybrid electric vehicles Parallel hybrid electric vehicles Start – stop hybrids, Mild hybrids, strong and full hybrids, Extended range hybrid vehicles, and full electric vehicles (BEV)	10	18%
4	 Energy Storage Systems: Batteries - Lead-acid battery, High temperature batteries for back-up applications like Zebra cell Li-iron sulfide cells, Li-S cells Flow batteries for load leveling and large scale grid application Vanadium and iron based batteries. Battery Recycling Technologies- Technology and economic aspects of battery recycling 	12	20%
5	Fuel Cells and Hydrogen Storage: Advance fuel cells- Introduction to fuel cells PEM and alkaline fuel cells for transportation Solid oxide fuel cells Hydrogen storage systems- Solid state hydrogen storage tanks Gas phase hydrogen storage tanks Cryogenic hydrogen storage tanks Liquid phase hydrogen storage tanks	12	20%
6	Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.	10	18%
	Total	60	100%

LESSON PLANE

Sr.	Lecture No	Course Content			
No					
1	1	Introduction:	1		
		Air pollution and global warming			
2	2	Impact of different transportation technologies on environment	1		
3	3	Impact of different transportation technologies on environment	1		

4	4	Energy supply	1				
5	5	History of hybrid electric	1				
6	6	Electric and fuel cell vehicles.	1				
7	7	Electric vehicles:	1				
		Electric vehicles configuration					
8	8	Energy and power requirements for various hevs	1				
9	9	Energy and power requirements for various hevs	1				
10	10	Energy and power requirements for various hevs	1				
11	11	Evs Vehicle performance	1				
12	12	vs Vehicle performance					
13	13	Driving cycles					
14	14	Driving cycles	1				
15	15	Hybrid Electric Vehicles: introduction	1				
16	16	Fundamentals of hybrid electric vehicles	1				
17	17	Series hybrid electric vehicles	1				
18	18	Parallel hybrid electric vehicles	1				
19	19	Hybrid electric vehicles	1				
20	20	Start – stop hybrids	1				
21	21	Mild hybrids	1				
22	22	Strong and full hybrids	1				
23	23	Extended range	1				
24	24	Hybrid vehicles	1				
25	25	Full electric vehicles (BEV)					
26	26	Energy storage systems: batteries					
27	27	Lead-acid battery					
28	28 High temperature batteries for back-up applications						
29	29 29 Zebra cell Li-iron sulfide cells						
30	30	Li-S cells Flow batteries for load leveling	1				
31	31	Li-S cells Flow batteries for load leveling	1				
32	32	Large scale grid application.	1				
33	33	Large scale grid application.	1				
34	34	Vanadium and iron based batteries	1				
35	35	Vanadium and iron based batteries	1				
36	36	Battery Recycling Technologies- Technology and economic aspects of battery recycling	1				
37	37	Battery Recycling Technologies- Technology and economic aspects of battery	1				
38	38	Fuel Cells and Hydrogen Storage: Advance fuel cells-	1				
39	39	Introduction to fuel cells	1				
40	40	PEM and alkaline fuel cells	-				
41	41	PEM and alkaline fuel cells	1				
42	42	PEIVI and alkaline fuel cells					
43	43	Transportation Solid oxide fuel cells	1				
44	44	Hydrogen storage systems- Solid state hydrogen storage tanks	1				
45	45	Hydrogen storage systems- Solid state hydrogen storage tanks	-				
46	46	Gas phase hydrogen storage tanks	-				

47	47	Cryogenic hydrogen storage tanks,	1			
48	48	Liquid phase hydrogen storage tanks	1			
49	49	Liquid phase hydrogen storage tanks	1			
50	50	Energy management strategies: introduction	1			
51	51	Introduction to energy management strategies used in hybrid and	1			
52	52	Introduction to energy management strategies used in hybrid and				
53	53	Electric vehicles				
54	54	Electric vehicles				
55	55	Classification of different energy management strategies				
56	56	Classification of different energy management strategies				
57	57	Comparison of different energy management strategies	1			
58	58	Comparison of different energy management strategies	1			
59	59	Implementation issues of energy management strategies				
60	60	Implementation issues of energy management strategies	1			
		TOTAL Hrs. Required To complete Task	60			

LIST OF PRACTICAL

Sr.	Title	Lab Hrs.
No.		
1	Study basic of subjects.	2
2	Study basic of electrical vehicles.	2
3	Study basic of hybrid electric vehicles.	2
4	Study various fundamentals of battery.	4
5	Study testing of battery with hydrometers.	4
6	Study battery recycling technologies.	4
7	Study Fuel Cells technology.	4
8	Study the hydrogen storage systems.	4
9	Study Energy Management Strategies.	4
	Total	30

STUDENTS LEARNING OUTCOME

On successful completion of the course

- Be able to understand fundamentals of subject
- Be able to interpret theoretical knowledge with practical application.
- Be able to produce new concept in engineering.

TEXT BOOKS

1. Electric and Hybrid vehicles by IQBAL HUSAIN

REFERENCE BOOKS

- G-A. Nazri and G. Pistoa, Lithium Batteries, Science and Technology, Kluwer Academic Publisher.
- 2. H. A. Kiehne, "Battery Technology Handbook," Marcel Dekker, NYC
- **3.** James Larminie and John Lowry, "Electric Vehicle Technology Explained," John Wiley
- **4.** D. Linden and T. S. Reddy, "Handbook of Batteries," 3rd Edition, McGraw-Hill
- 5. D. A. J. Rand, R. Woods, and R. M. Dell, "Batteries for Electric Vehicles,"
- 6. Society of Automotive Engineers," Warrendale PA
- 7. D. Berndt, "Maintenance-Free Batteries", John Wiley & Sons, New York, 1997.
- M. Westbrook, "The Electric and Hybrid Electric Car," Society of Automotive •Engineers," Warrendale PA

WEB MATERIALS:

• http://www.wikipedia.org

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 1st Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE107-N-C	Subject Title: Quality Control & Reliability Engineering

	Teaching	Scheme			Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- The aim of this course is to make students understand and appreciate the importance of quality control and reliability analysis in industrial system.
- Students can get acquainted with different reliability calculation models.
- The course is also aimed at making students aware of latest quality improvement methodology like Six Sigma.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Sr No	Content	Total Hrs	Weightage (%)
1	Introduction: Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality cost.	5	10
2	Process Control for Variables and Attributes: Causes of Variation, Control Charts for Variables (Mean and Range, Mean and Standard Deviation, Cumulative Sum Control Chart), Control Chart Patterns and Corrective Actions, Control Charts for Attributes (p- chart, np-chart, c-chart, u-chart), Acceptance Sampling Plans (Concepts of Producer's and Consumer's Risks, Types of Sampling Plans and their merits and demerits, Operating Characteristic Curve, Average Outgoing Quality Curve), Errors in Making Inferences from Control Charts (Type I and II errors).	10	20
3	Designing for Quality: Introduction to Concurrent Engineering, Quality Function Deployment (QFD) and Failure Mode and Effect Analysis (FMEA) – Concept, Methodology and Application.	10	20
4	Six Sigma Fundamentals: Basic Concept, Methodology, Process Improvement Model (DMAIC) Steps (Objectives, Tools and Techniques Used), Six Sigma Organization, Six Sigma Implementation Requirements, Introduction to Lean Manufacturing.	10	10
5	RELIABILITY ENGINEERING: Reliability function, failure rate, Mean time between failures (MTBF), Mean time to failure (MTTF), mortality curve, useful life availability, maintainability, system effectiveness. Introduction to probability distributions. Time to failure distributions: Exponential, normal, Gamma, Weibull; ranking of data, probability plotting techniques, Hazard plotting Concept of Bathtub Hazard Rate curve, Reliability evaluation of two- state device networks-series, parallel, k-out-of-m systems; Standby redundant systems, Reliability evaluation of three-state device networks-series and parallel.	10	20
6	Reliability Determination and Prediction: Reliability Determination Methods: Network reduction technique, Path tracing technique, Decomposition technique, Delta-Star method. Advanced Reliability Evaluation Concepts: Supplementary variables technique, Interference theory, Human reliability, Common cause failures, Fault trees, Failure mode and effect analysis. Reliability Prediction Models: Series and parallel systems - RBD approach - Standby systems - m/n configuration - Application of Baye's theorem - cut and tie set method - Markov analysis - FTA - Limitations.	5	10
7	Reliability Management: Reliability testing: Time acceleration factor, influence of acceleration factor in test planning, application to acceleration test, high temperature operating life acceleration model, temperature humidity	5	5

	bias acceleration model, temperature cycle acceleration model, vibration accelerator model, failure free accelerated test planning. Accelerated reliability growth.		
8	Risk Assessment: Definition and measurement of risk - risk analysis techniques - risk reduction resources - industrial safety and risk assessment.	5	5
	TOTAL	60	100

LESSON PLANNING

Sr.	LECTURE NO	Course Content	Hrs.
No			
1	1	Introduction of Quality	1
2	2	Definition of quality and basic concept of quality,	1
3	3	Definition and concept of SQC	1
4	4	benefits and limitation of SQC	1
5	5	Quality assurance, Quality cost.	1
6	6	Process Control for Variables and Attributes: Causes of Variation	1
7	7	Control Charts for Variables (Mean and Range, Mean and Standard Deviation, Cumulative Sum Control Chart)	1
8	8	Control Chart Patterns and Corrective Actions	1
9	9	Control Charts for Attributes (p-chart, np-chart, c-chart, u-chart)	1
10	10	Acceptance Sampling Plans, Concepts of Producer's and Consumer's Risks,	1
11	11	Types of Sampling Plans and their merits and demerits	1
12	12	Operating Characteristic Curve,	1
13	13	Average Outgoing Quality Curve	1
14	14	Errors in Making Inferences from Control Charts (Type I and II errors)	1
15	15	Errors in Making Inferences from Control Charts (Type I and II errors)	1
16	16	Concept of Designing for Quality	1
17	17	Brief study of Designing for Quality	1
18	18	Introduction to Concurrent Engineering	1
19	19	Brief study of Concurrent Engineering	1
20	20	Brief study of Concurrent Engineering	1
21	21	Quality Function Deployment (QFD)	1
22	22	Quality Function Deployment (QFD)	1

23	23	Quality Function Deployment (QFD)	1
24	24	Failure Mode and Effect Analysis (FMEA) – Concept	1
25	25	FMEA- Methodology	1
26	26	FMEA – Application	1
27	27	Six Sigma Fundamentals: Basic Concept	1
28	28	Six Sigma Fundamentals: Basic Concept	1
29	29	Six Sigma Fundamentals: Methodology	1
30	30	Six Sigma Fundamentals: Methodology	1
31	31	Process Improvement Model (DMAIC) Steps (Objectives, Tools and Techniques Used)	1
32	32	Concept of Six Sigma Organization	1
33	33	Brief study of Six Sigma Organization	1
34	34	Six Sigma Implementation Requirements	1
35	35	Introduction to Lean Manufacturing	1
36	36	Reliability Engineering: Reliability function and failure rate	1
37	37	Mean time between failures (MTBF)	1
38	38	Mean time to failure (MTTF)	1
39	39	mortality curve, useful life availability, maintainability	1
40	40	system effectiveness. Introduction to probability distributions	1
41	41	Time to failure distributions: Exponential, normal, Gamma, Weibull; ranking of data	1
42	42	probability plotting techniques, Hazard plotting Concept of Bathtub Hazard Rate curve	1
43	43	Reliability evaluation of two-state device networks-series and parallel	1
44	44	k-out-of-m systems, Standby redundant systems	1
45	45	Reliability evaluation of three-state device networks-series and parallel	1
46	46	Reliability Determination and Prediction: Reliability Determination Methods: Network reduction technique	1
47	47	Path tracing technique, Decomposition technique, Delta-Star method.	1
48	48	Advanced Reliability Evaluation Concepts: Supplementary variables technique, Interference theory	1
49	49	Human reliability, Common cause failures, Fault trees, Failure mode and effect analysis	1
50	50	Reliability Prediction Models: Series and parallel systems - RBD approach - Standby systems - m/n configuration - Application of Baye's theorem - cut and tie set method - Markov analysis - FTA –	1

		Limitations	
51	51	Reliability Management:	1
		Reliability testing: Time acceleration factor, influence of acceleration	
		factor in test planning, application to acceleration test	
52	52	high temperature operating life acceleration model	1
53	53	temperature humidity bias acceleration model, temperature cycle acceleration model, vibration accelerator model	1
54	54	failure free accelerated test planning. Accelerated reliability growth	1
55	55	Risk Assessment: Definition and measurement of risk -	1
56	56	risk analysis techniques	1
57	57	risk reduction resources	1
58	58	risk reduction resources	1
59	59	industrial safety and risk assessment	1
60	60	industrial safety and risk assessment	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL:

- 1. Exercise on Control Charts for Variables and Attributes
- 2. Case Study on FMEA
- 3. Case study on implementation of Six Sigma
- 4. Exercise on reliability concepts and calculations of MTBF and MTTF
- 5. Exercise on reliability data analysis.
- 6. Exercise on reliability mathematics, bath-tub curve.
- 7. Exercise on reliability prediction model.
- 8. Exercise on risk assessment.
- 9. Estimating reliability of a mechanical component and validating from the published / available / experimental data and suggest design modifications if required

STUDENTS LEARNING OUTCOME

After successful completion of the course, the student will be able to

- Understand the concepts of quality control, improvement and management.
- Understand the concept of design for quality.
- Understand the concepts of reliability.
- Understand and carry out reliability data analysis.
- Get acquainted with various reliability prediction and evolution methods.
- Learn fundamentals of reliability management and risk assessment.

TEXT BOOKS & REFERENCE BOOKS

1. Grant E L, Statistical Quality Control", McGraw-Hill.

- 2. Shrinath L S, Reliability Engineering" Affiliated East west press.
- 3. Besterfield D H, Quality Control, Prentice Hall.
- 4. Sharma S C, Inspection Quality Control and Reliability, Khanna Publishers.
- 5. Connor P.D.T.O. Practical Reliability Engineering", John Wiley.
- 6. Naikan V N A Reliability Engineering and Life Testing", PHI Learning Private Limited.
- 7. Prabhakar Murthy D N and Marvin R, "Product Reliability", Springer-Verlag.
- 8. Dana Crowe and Alec Feinberg, Design for Reliability, CRC Press.
- John W Priest and Jose M Sanchez, "Product Development and Design for Manufacturing – A Collaborative Approach to Producibility and Reliability", Second Edition, Marcel Dekker.

WEB MATERIALS

- http://www.wikipedia.org
- http://nptel.ac.in
- http://ocw.mit.edu

ME MECHANICAL-AUTOMOBILE ENGINEERING SEMESTER-2

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MFCC201-N	Subject Title: TECHNICAL COMMUNICATION
	Subject fille. The filler control of the filler

,	Teachin	Teaching Scheme Evaluation Scheme								
L	Т	Р	Total	Total Credit	Th	eory	IE	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs	Creuit	Hrs	Marks	Marks	Marks	Marks	Marks
2	0	0	2	2	3	70	30	20	-	120

LEARNING OBJECTIVES:

This subject intends to bring orientation towards technical communication for PG students. The PG Scholars shall acquire essential skills pertaining to technical communication which are required for various PG activities such as research, seminars, dissertation, report/paper writing, defending examination etc. The course would also help students in identifying different sources of information for literature review and data collection. It would further assist the PG scholars in understanding the drafting technical documentation including research paper/thesis/articles/reports. Further, the scholars are intended understand issues such as ethics, internet communication, gender & diversity issues etc. pertaining to technical communication.

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment

(CIA) Scheme)

- 1. At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- **2.** Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- **3.** Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- **4.** One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- **5.** Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- **6.** Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Sr. No.	Date/Week	Unit No.	Percentage Weight age.	Topic No:
1	1^{st} , 2^{nd} , 3^{rd}	Unit :1,2	20	1
2	4 th ,5 th ,6 th	Unit:3	20	2

OUTLINE OF THE COURSE:

3	7 th ,8 th ,9 th	Unit:4	20	3
4	$19^{\text{th}} \text{ b}, 11^{\text{th}}, 12^{\text{th}}$	Unit:5	20	4
5	13 th ,14 th ,15 th	Unit:6	20	5

Total Hours (Theory): 30 Total Hours (Lab): 00 Total Hours: 30

DETAILED SYLLABUS

- 1. Essence of Technical Communication: Analogy of Question/Answer to Problem/Solution. Steps in technical communication and practical guidelines. Hypothesis. Active-Passive voice, Direct-Indirect Speech.
- 2. Organization of technical report: Title, Authors, Affiliation, Abstract, Introduction, Literature survey, Methods, Result, Discussion, Figures, Tables, Conclusion, References, Acknowledgement, Communication with editor.
- 3. Patent Drafting and submission, preparing document for Technology Transfer, MOUs, Confidentiality agreement, SI prefixes, fundamental constants, standard Abbreviations & Scientific & Technological sign & symbols.
- 4. Wisdom of Internet Communication. Gender and diversity issues and stereotypes used in technical communication.
- 5. Ethical issues in engineering research, Avoid Plagiarism, citations methodology
- 6. Preparation & Presentation of research proposal for funding agencies. Poster presentations, Graphical Abstract and Highlights of Research article/proposal/Manuscript. Use of applicable simulation-platforms / open-source toolkits for scientific visualization of data.

Sr. No	LECTURE NO	Course Content	Hrs.	Percentage Weightage	
1	1	Essence of Technical Communication	1		
2	2	Analogy of Question/Answer to Problem/Solution	1		
3	3	Steps in technical communication and practical guidelines	1		
4	4	Hypothesis	1		
5	5	Active-Passive voice, Direct-Indirect Speech	-Passive voice, Direct-Indirect Speech 1		
6	6	Organization of technical report: Title, Authors, 1 50%		50%	
7	7	Affiliation, Abstract, Introduction, Literature survey	on, Abstract, Introduction, Literature survey 1		
8	8	Methods, Result, Discussion, Figures, Tables, Conclusion	Figures, Tables, Conclusion 1		
9	9	References, Acknowledgement1			
10	10	Communication with editor	1		
11	11	Patent Drafting and submission	1		

LESSON PLANNING

12	12	preparing document for,	1			
13	13	Technology Transfer, MOUs 1				
14	14	Confidentiality agreement, SI prefixes	1			
15	15	fundamental constants	1	1		
16	16	standard Abbreviations & Scientific & Technological sign & symbols	1			
17	17	Wisdom of Internet Communication	1			
18	18	Gender and diversity issues	1			
19	19	stereotypes used in technical communication	1			
20	20	Ethical issues in engineering research	1			
21	21	Avoid Plagiarism	1			
22	22	citations methodology	1			
23	23	Preparation & Presentation of research proposal for funding	1			
		agencies		50%		
24	24	Poster presentations, Graphical	1			
25	25	Abstract and Highlights of Research article/proposal/Manuscript	1			
26	26	Use of applicable simulation-platforms / open-source toolkits for scientific visualization of data	1			
27	27	Case Study	1			
28	28	Case Study	1			
29	29	Case Study	1			
30	30	Case Study	1			
		TOTAL Hrs. Required To complete Task	30			

STUDENTS LEARNING OUTCOME:

At the end of this course, the student would be able

- To understand the process of research and learn the technical skills to communicate his/her research
- To learn identifying/drafting problem statement for his/her research domain
- To understand/draft different components of research papers
- To understand the significance of patenting and related drafting
- To understand notes taking, paraphrasing, elevator pitch, gender & diversity issues and ethical issues in technical communication

List of Reference Books:

- C. R. Kothari, "Research Methodology: Methods and Techniques", New Age International Publishers
- Raman, Meenakshi and Sangeeta Sharma, "Technical Communication: Principle and Practice", Oxford University Press.
- Stuart Johnson and Jon Scott, " Study and communication skills for Biosciences, Oxford University press
- Robert A. Day, "Write and Publish a scientific Paper" Oryx Press
- Jennifer Peat, "Scientific Easy when you know how", BMJ books
- Paul G. Chapin, "Research Projects and Research Proposals A Guide for Scientists seeking funding, University Press
- Sharon Gerson, Steven Geson, "Technical Writing: Process and Product", Pearson Education.
- Sunita Mishra, C, Murlikrishna, "Communication Skills for Engineers", Pearson Education.

List of References:

- 1. http://dl.acm.org/
- 2. http://springer.com/
- 3. http://sciencedirect.com/ (http://elsevier.com/)
- 4. http://ieeexplore.ieee.org/
- 5. https://scholar.google.co.in/
- 6. https://www.scopus.com/
- 7. https://iitbombayx.in/

E-Resources / Web Links:

- 1. http://courses.writing.ufl.edu/3254/Textbook/Lannon%20Instructor%20Manual%2012e.pdf
- 2. http://www.limat.org/data/research/Research%20Methodology.pdf
- 3. http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-Research_Methodology_A_Step-by-Step_G.pdf
- 4. http://www.ndc.gov.ng/Lectures/Research-Methodology.pdf

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE202-N	Subject Title: AUTOMOTIVE COMPONENT DESIGN

	Teachin	g Schem	e		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- To present a problem oriented in depth knowledge of subject.
- To make student get acquainted with to standardize the automobile part after designing the component like gear, gear box, piston, connecting rod, piston pin, crank shaft, valve mechanism, Cylinder liner, flywheel etc and to select the required bearing for same by considering the different design considerations.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Unit No	Topics	Lectures	Weightage (%)
1	Standardization in automobile system design: Preferred numbers – preferred series – derived series- and their applications in design.	5	10%
2	Design Considerations: Manufacturing and assembly considerations, Design of components, for casting, welding, forging, hot and cold working, machining etc. assembly considerations in design. Design for Fatigue and Creep –thermal considerations – wear considerations in design – Human considerations in design.	8	15%
3	 Design of Bearings: Bearing Identification/Designations. Rolling Contact Bearing: Types of rolling contact bearings, static and dynamic load, capacities, Stribeck's Equation, Equivalent bearing load, load life, relationship, Bearing life, Load factor, Selection of bearings from manufacturers catalogue. Lubrication and mountings, dismounting and preloading of bearings, Oil seals and packing. Sliding Contact Bearings: Bearing material and their properties, Bearing types and their, constructional details, Hydrodynamic Lubrication- Basic theory, Design consideration in hydrodynamic bearings, Raimondi and Boyd method relating bearing variables. 	10	20%
4	 Design of Gears: Types of gears, Design consideration of gears, material selection, Types of gear failures, Gear lubrication. Spur Gears: Force analysis, Number of teeth, Face width & Beam strength of gear tooth. Dynamic tooth load. Effective load on gear tooth Estimation of module based on beam strength. Wear strength of gear design for maximum power transmission. Helical Gears: Virtual number of teeth, Tooth proportions, Force analysis, Beam strength of helical gears, Design of helical gears. Bevel Gears: Terminology of bevel gears, Force analysis, Beam strength of bevel gears, Wear strength of bevel gear, Effective load on gear tooth. Design of bevel gear. Worm Gears: Force analysis, Friction in worm gear, Vector method, Strength rating of worm gears, Wear rating of worm gears. 	15	25%
5	Design of Gearbox : Design considerations of gearbox, selection of proper gear ratios, for an automobile gearbox, design of shafts, splines, and gears for gear box used in automobiles.	10	15%
6	Design of I.C. Engine Components: Engine power requirements, Selection of engine type, Stroke &Bore, compression ratio, clearance volume and swept volume, mean piston speeds. Design of Piston & Piston pin: Materials used, design of piston crown, pin dimensions.	12	15%

 Design of Crank shaft & Connecting Rod -Forces, material, types, design criteria, dimensions etc. Design of main journal bearing pin and connecting rod bearingpin of Crank shaft. Main journal bearing and connecting rod bearing (small end &big end), Cam shaft bearings: Bearing materials, design criteria,types and dimensions. Cylinder block dimensions, Types of liner– Dry & Wet type. Valve mechanism Design: Valve, rocker arm, Valve springdesign, Push rod, cam shaft and cam follower etc. Design of cylinder head: Stresses, materials, Combustion chamber design. Flywheel types & construction, criteria of design for solid and rim type., Selection of Engine layouts. Design Criteria of intake manifold and exhaust manifold. Introduction to CFD analysis (flow & thermal impact related inputs and outcome) Engine lubrication system and pumps 	60	100%
TOTAL Hrs. Required To complete Task	60	100%

LESSON PLANE

Sr.	Lecture	Course Content	Hrs.
No	No		
1	1	Standardization in automobile system design	1
2	2	Introduction	1
3	3	Preferred numbers	1
4	4	Preferred series	1
5	5	Derived series- and their applications in design.	1
6	6	Design Considerations:Manufacturing and	1
7	7	Assembly considerations	1
8	8	Design of components, for casting, welding, forging	1
9	9	Hot and cold working, machining etc	1
10	10	Assembly considerations in design	1
11	11	Design for Fatigue and Creep –thermal considerations	1
12	12	Wear considerations in design	1
13	13	Human considerations in design.	1
14	14	Spur gears:	1
		Force analysis, number of teeth	
15	15	Face width & Beam strength of gear tooth. Dynamic tooth load. Effective	1
		load on gear tooth Estimation of module based on beam strength	
16	16	Wear strength of gear tooth. Estimation of module based on wears	1
		strength. Spur gear design for maximum power transmission	
17	17	Helical Gears: Virtual number of teeth, Tooth proportions, Force analysis	1
18	18	Beam strength of helical gears, Effective load on gear tooth	1
19	19	Wear strength of helical gears	1
20	20	Design of helical gears	1
21	21	Bevel Gears: Terminology of bevel gears, Force analysis	1
22	22	Beam strength of bevel gears	1

23	23	Wear strength of bevel gear, Effective load on gear tooth	1
24	24	Design of bevel gear	1
25	25	Worm Gears: Force analysis, Friction in worm gear	1
26	26	Vector method	1
27	27	Strength rating of worm gears	1
28	28	Wear rating of worm gear	1
29	29	Design of Gearbox : Introduction	1
30	30	Design considerations of gearbox	1
31	31	Design considerations of gearbox	1
32	32	Selection of proper gear ratios	1
33	33	Selection of proper gear ratios	1
34	34	Automobile gearbox	1
35	35	Automobile gearbox	1
36	36	Design of shafts	1
37	37	Design of shafts	1
38	38	Splines, and gears for gear box used in automobiles	1
39	39	Design of I.C. Engine Components: Introduction	1
40	40	Engine power requirements	1
41	41	Selection of engine type	1
42	42	Stroke & Bore, compression ratio	1
43	43	Clearance volume and swept volume, mean piston speeds	1
44	44	Design of Piston &: Materials used, ,.	1
45	45	Piston pin	1
46	46	Design of piston crown	1
47	47	Pin dimensions	
48	48	Design of Crank shaft	1
49	49	Connecting rod	1
50	50	Forces, material, types, design criteria, dimensions etc.	1
51	51	Design of main journal bearing pin and connecting rod bearing pin of Crank shaft	1
52	52	Main journal bearing and connecting rod bearing (small end &big end),	1
53	53	Cam shaft bearings: Bearing materials, design criteria, types and dimensions.	1
54	54	Cylinder block dimensions, Types of liner– Dry & Wet type	1
55	55	Valve mechanism Design: Valve, rocker arm, Valve springdesign, Push	1
		rod, cam shaft and cam follower etc	
56	56	Design of cylinder head: Stresses, materials, Combustion chamber design	1
57	57	Flywheel types & construction, criteria of design for solid and rim type.,	1
		Selection of Engine layouts	
58	58	Design Criteria of intake manifold and exhaust manifold	1
59	59	Introduction to CFD analysis (flow & thermal impact related inputs and	1
		outcome)	
60	60	Engine lubrication system and pumps	1
		IOTAL Hrs. Required To complete Task	60

STUDENTS LEARNING OUTCOME

After successful completion of the course, student will be able to:

- Student will be able to select and design the different automobile components.
- Student will be able to standardize the different parts.
- Student will be able to give reasons of assumptions made while designing the component with reference to manufacturing assembly, thermal and wear considerations point of view.

LIST OF PRACTICAL

Sr.	Title	Lab Hrs.
No.		
1	To standardize the given automobile part for size, torque and	02
	power point of view.	
2	To design the spur, helical, bevel and worm gear for given situation	02
	of automobile vehicle.	
3	To design the gear box for given situation of automobile vehicle.	02
4	To design the engine cylinder for given situation of automobile	02
	vehicle.	
5	To design the piston for given situation of automobile vehicle.	04
6	To design the flywheel for given situation of automobile vehicle.	02
7	To design the valve and valve mechanism for given situation of	04
	automobile vehicle.	
8	To design the connecting rod for given situation of automobile	04
	vehicle.	
9	To select the bearing for given situation to support the	04
	rotating/sliding part of an engine.	
10	To give reason of design considerations during the above part and	04
	assembly design for which you made assumptions.	
	Total Hrs	30

TEXT BOOKS

1. J Brown, A J Roberstson, S Serphento, "Motor Vehicle Structure: Concepts and Funtamentals, Butterworth-Heinemann.

REFERENCEBOOKS

- 1. Elements of Motor Vehicles Design by D T Bdonkins, TMH
- 2. Automobile Chassis Design and calculations by P. Lukin, Mir Publishers
- 3. Auto design Problems by K. M. Agrawal, Satya prakashan.
- 4. Automotive Mechanics by N. K. Giri, Khanna Publishers
- 5. Machine Design by Sadhu singh, Khanna Publishers
- 6. Automobile Chassis Design by Dean Averns, Lllife Books Ltd (1992)
- 7. Automobile Engg. Vol-I & II by Kirpal Singh, Standard Pub.
- 8. Automobile Engg. Vol-I & II by K.M.Gupta, Umesh Pub.

9. Auto Design by R. B. Gupta, Satya Prakashan

10. "Mechanical Engineering Design", Fourth Edition, by Joseph E. Shigley & Larry D.Mitchell, McGraw-HillInternational Book Company

- 11. Design of Machine Elements by Bhandari, Tata McGraw-Hill Publishing Company Ltd
- 12. Machine Design by, Sharma and Agrawal, S. K. Kataria& Sons
- 13. Transmission System Design by R. B. Patil, Tech Max Pub, Pune.
- 14. Machine Design Vol-II & III by F.Haideri, NiraliPrakashan, Pune.
- 15. PSG Design Data Book.
- 16. Automotive Chassis by P. M. Heldt, Chilton Co., NY(1992)
- 17. Machine Design by Pandya and Shah, Charotar Publishing House.
- 18. Machine Design by R. S. Khurmi, J. K. Gupta, Schand& Co.
- 19. Bearing Manufacturers Catalogues.

WEB MATERIALS

- <u>http://www.wikipedia.org</u>
- <u>http://nptel.ac.in/</u>
- <u>www.learnerstv.com</u>

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE203-N	Subject Title: FUELS, ALTERNATIVE FUELS & LUBRICANTS

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

LEARNING OBJECTIVE

The educational objectives of this course are

- To understand the different alternative fuels and different types of lubricants.
- To develop ideas for engine modification and use of alternative fuels & study about

the different types of lubricating system.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit	Topics	Lectures	Weightag
No			e (%)
1	Conventional fuels ; Estimation of conventional fuels; advantages and disadvantages of conventional fuels; Need for Alternate fuel; Availability and Comparative properties of Alternate fuels; Use of Alcohols; LPG, Hydrogen; CNG and LNG; Vegetable oils and Biogas in Automotive Engines;, Relative merits and demerits of various alternate fuels.	4	10%
2	Manufacture of Alcohols ; Properties as engine fuels Alcohols and Gasoline blends; Performance in S. I. Engines: Methanol and gasoline blends; Effect of compression ratio; Alcohols in Stratified charge engines; Combustion characteristics in engines; Reformed alcohols use in Cl Engines; Ignition accelerators; Alcohol Diesel emulsions; Dual fuel systems.	4	10%
3	Various vegetable oils for engines; Esterification Performance in engines; Biogas in engines; Performance and Emission characteristics; Shale oil, coal liquid and Tars and fuel; Performance and Emission characteristics.	5	10%
4	Availability of CNG; Properties; Modification required to use in Engines; Performance and Emission characteristics of CNG, LPG in SI and CI Engines; Performance and Emission data for LPG; Hydrogen Production methods; Storage and handling; Performance; Safety aspects.	5	10%
5	Theory of Lubrication : MPFI Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, hydrodynamic lubrication, boundary lubrication, Hydrostatic lubrication bearing lubrication, functions of the lubrication system.	8	20%
6	Lubricants: Specific requirements for automotive lubricants, types of lubricants, types of greases, characteristics of lubricating oils, viscosity, factors affecting viscosity and viscosity index, additives in lubricant, grades of lubricating oils and their designation, deterioration in lubricating oils.	9	20%
7	Lubricating System: Types of lubricating system, splash lubrication, pressure feed lubrication, oil strainer, oil pump, oil filters, cooling of lubricating oils, semi pressurized lubrication system, dry sump lubrication, crankcase ventilation, chassis lubrication.	10	20%
	Total	45	100%
Sr.	Lecture	Course Content	Hrs.
-----	---------	--	------
No	No		
1	1	Conventional fuels; Estimation of conventional fuels; advantages and	1
		disadvantages of conventional fuels.	
2	2	Need for Alternate fuel; Availability and Comparative properties of	1
		Alternate fuels	-
3	3	Use of Alcohols; LPG, Hydrogen; CNG and LNG; Vegetable oils and Biogas	1
		in Automotive Engines.	1
4	4	Relative merits and demerits of various alternate fuels.	1
5	5	Manufacture of Alcohols; Properties as engine fuels Alcohols and	1
6	6	Mathanal and gasaling blands: Effect of compression ratio: Alcohols in	1
0	0	Stratified charge engines	I
7	7	Compussion characteristics in engines. Reformed alcohols use in CL	1
		Engines: Ignition accelerators:	
8	8	Alcohol Diesel emulsions; Dual fuel systems.	1
9	9	Various vegetable oils for engines; Etherification Performance in engines.	1
10	10	Biogas in engines; Performance.	1
11	11	Emission characteristics; Shale oil,	1
12	12	Coal liquid and Tars and fuel;	1
13	13	Performance and Emission characteristics.	1
14	14	Availability of CNG; Properties; Modification required to use in Engines;	1
		Performance and Emission characteristics of CNG.	
15	15	Performance and Emission data for LPG.	1
16	16	LPG in SI and CI Engines;	1
17	17	Hydrogen Production methods	1
18	18	Storage and handling; Performance; Safety aspects.	1
19	19	Theory of Lubrication : MPFI Engine friction: introduction	1
20	20	Total engine friction	1
21	21	Effect of engine variables on friction	1
22	22	Hydrodynamic lubrication	1
23	23	Hydrodynamic lubrication	1
24	24	Boundary lubrication	1
25	25	Hydrostatic lubrication bearing lubrication.	1
26	26	Functions of the lubrication system.	1
27	27	Lubricants: Specific requirements for automotive lubricants.	1
28	28	Types of lubricants	1
29	29	Types of greases	1
30	30	Characteristics of lubricating oils, viscosity	1
31	31	Factors affecting viscosity and	1
32	32	Viscosity index	1
33	33	Additives in lubricant	1
34	34	Grades of lubricating oils and their designation.	1
35	35	Deterioration in lubricating oils.	1

36	36	Lubricating System: Types of lubricating system,	1
37	37	Splash lubrication.	1
38	38	Pressure feed lubrication	1
39	39	Oil strainer,	1
40	40	Oil pump, oil filters	1
41	41	Cooling of lubricating oils	1
42	42	Semi pressurized	1
43	43	Lubrication system	1
44	44	Dry sump lubrication	1
45	45	Crankcase ventilation, chassis lubrication	1
		TOTAL Hrs. Required To complete Task	45

STUDENTS LEARNING OUTCOME

The student can identify different areas of automobile fuels and lubricants. Can find the applications of all the areas in day to day life.

LIST OF PRACTICAL

Sr.	Title	Lab
No.		Hrs.
1	Study of International and National standards for fuels and lubricants.	2
2	Draw the chart & describe distillation process of crude.	2
3	Determination of viscosity of lubricating oil at different temperature.	2
4	Determination of flash and fire point of given sample fuel.	2
5	Determination of cloud and pour point of given sample of oil.	2
6	Testing of fuels - Ultimate analysis, proximate analysis.	4
7	ASTM distillation test of liquid fuels.	4
8	Calorific value of liquid fuel.	4
9	Calorific value of gaseous fuel.	4
10	Study of Octane and Cetane Number of fuels.	4
	Total Hrs	30

TEXT BOOKS & REFERENCE BOOKS

- 1. Alternate fuels guide book, Bechtold R.L, SAE
- 2. Solar Engineering of Thermal Processes Duffie & Beckman John Wiley
- V.Ganesan, "Internal Combustion Engines" Tata McGraw-Hill Publishing Co. Newdelhi

- 4. M.L.Mathur and P.Sharma "A course in internal combustion engines", Dhanpatrai Publications
- 5. Brame, J.S.S. and King, J.G. Fuels Solids, Liquids, Gaseous.
- 6. Francis, W Fuels and Fuel Technology, Vol. I & II
- 7. Hobson, G.D. & Pohl.W- Modern Petroleum Technology
- A.R.Lansdown Lubrication A practical guide to lubricant selection Pergamon press – 1982.
- 9. Raymond.C.Gunther Lubrication Chilton Book Co., 1971.
- 10. K.M.Gupta vol-1-Automobile Engineering-umesh publications.

WEB MATERIALS:

• <u>http://www.wikipedia.org</u>

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE204-N Subject Title: TRANSPORT MANAGEMENT & LAWS

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	The	eory	IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	0	3	3	3	70	30	20	00	120

LEARNING OBJECTIVES

The educational objectives of this course are

• To understand the different transport management and laws

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.

DETAILED SYLLABUS

Unit	Topics	Lectures	Weightag
No		(Hours)	e (%)
1	Elements of Mass Transportation: History of transport, modes of	04	
	transport, types of transport.		30%
2	Transport Management: Transport organization structure, operations,	04	
	General set up, transport industry, government / (STU) State		

	Government Undertakings and private Bus transport organizations. Bus		
	depot organization structure. Truck feet operators organization.		
3	Economics of Road Transport: Theory of fares and cost of services, fare	06	
	charging, costing and statistics of operating cost.		
4	Planning for New Transport Organization: Geographical considerations,	02	
	economic factors, vehicles used, planning of trips. Concept of BRTS		30%
	operations.		
5	Organization of Transport Services: Records and fleet management,	04	
	vehicles schedule, booking and reservation, statistical records and		
	shipment center, recording of goods transport.		
6	Motor Vehicle Act: Acts & definitions, Licensing of drivers and conductors	10	
	, registration of vehicles, control of transport, RTO and other regulations		
	offences, penalties and procedures, types of form and procedures,		
	licensing of taxies and buses, rules and regulations, testing and passing of		
	vehicles.		2024
7	Taxation: Structure, method of laying taxation, goods vehicle taxation,	02	20%
	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.		
8	Accident & Prevention: Vehicle accident, laws, injury, safety precautions,	05	
	road transport regulations.		
9	Insurance & Finance: Classes/types of insurance, accident claims and	04	
	settlements, duty of driver in case of accident, hire purchase.		
10	Laws Related to Pollution under Control (PUC): Pollution Under control	04	200/
	certification agency, Authority & procedure for PUC certification agency.		2070
	Harmful exhaust gas constituents, permissible limits, Euro / Bharat Stage		
	-I, II, III, IV norms and implementation, testing and measurements.		
	Total	45	100%
1			1

LESSON PLANE

Sr.	Lecture	Course Content			
No	No				
1	1	Elements of Mass Transportation: History of transport	1		
2	2	modes of transport	1		
3	3	Types of transport	1		
4	4	Transport organization structure	1		
5	5	Continue Transport organization structure	1		
6	6	Continue Transport organization structure	1		
7	7	Bus depot organization structure	1		
8	8	Economics of Road Transport: Theory of fares and	1		
9	9	cost of services, fare charging	1		

10	10	Statistics of operating cost			
11	11	Planning for New Transport Organization: Geographical considerations,	1		
12	12	economic factors, vehicles used	1		
13	13	planning of trips. Concept of BRTS operations.	1		
14	14	Organization of Transport Services: Records and fleet management	1		
15	15	vehicles schedule	1		
16	16	statistical records and shipment center	1		
17	17	Motor Vehicle Act: Acts & definitions	1		
18	18	Organizational structure of transport department and main functions of transport	1		
		department			
19	19	Forms and its application	1		
20	20	registration: necessity, registration by transport department, registration by vehicle manufacture dealers, temporary registration, refusal of registration, cancellation of registration	1		
21	21	Transfer of ownership of vehicle can be done. 1. Private vehicle 2. Commercial vehicle 3. In case of death of registered owner	1		
22	22	Endorse the hypothecation and its deletion and procedure for registration of new commercial vehicle	1		
23	23	Fee structure	1		
24	24	permit for goods venicle and permit for passenger's venicle	1		
25	25	Licensing of drivers and conductors	1		
20	20	points are considered for fuel economy	 1		
28	28	engine condition and driving habits effect on fuel economy	1		
29	29	detail principle of driving	1		
30	30	hill driving and driving through flooded areas	1		
31	31	Taxation: Structure, method of laying taxation,	1		
32	32	Goods vehicle taxation, passenger vehicle taxation,	1		
33	33	Mode of payment, tax exemption, one / life time taxation. Service Life of	1		
		vehicles.			
34	34	Toll tax reasons & operational management. Build Operate Transfer arrangement.	1		
35	35	Accident & Prevention: Vehicle accident	1		
36	36	Continue Accident & Prevention: Vehicle accident	1		
37	37	Continue Accident & Prevention: Vehicle accident	1		
38	38	Continue Accident & Prevention: Vehicle accident	1		
39	39	Insurance & Finance: Classes/types of insurance	1		
40	40	Continue Insurance & Finance: Classes/types of insurance	1		
41	41	Continue Insurance & Finance: Classes/types of insurance	1		
42	42	Continue Insurance & Finance: Classes/types of insurance	1		
43	43	Laws Related to Pollution under Control (PUC): Pollution Under control	1		
		certification agency, Authority & procedure for PUC certification agency. Harmful exhaust gas constituents, permissible limits, Euro / Bharat Stage			
44	44	Continue 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	1		
45	45	Continue Laws Related to Pollution under Control (PUC): Pollution Under control certification agency, Authority & procedure for PUC certification	1		

	agency. Harmful exhaust gas constituents, permissible limits, Euro / Bharat	
	Stage	
	TOTAL Hrs. Required To complete Task	45

STUDENTS LEARNING OUTCOME

On successful completion of the course

- The student can identify different areas transport management and laws in automobile engineering.
- Can find the applications of all the areas in day to day life.

TEXT BOOKS

- 1. Automobile Engineering Vol-1 by Kirpal Singh
- 2. Automobile Engineering Vol-1 byK.M.Gupta vol-1 and 2
- 3. Automobile Engineering R BGupta

REFERENCE BOOKS

- 1. Steed W., " Mechanics of Road vehicles ", Illiffe Books Ltd., London.
- 2. Newton Steeds & Garrot, "Motor vehicles", Butterworths, London.
- **3.** Judge A.W., "Mechanism of the car", Chapman and Halls Ltd., London.
- **4.** Giles.J.G., "Steering, Suspension and tyres ", Iliffe Book Co., London.
- 5. Crouse W.H., " Automotive Chassis and Body ", McGraw Hill. Newyork
- 6. Heldt P.M., "Automotive chassis ", Chilton Co., New York.

WEB MATERIALS

• <u>http://www.wikipedia.org</u>

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Th	eory	IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
0	0	2	2	1	-	-	-	60	100	160

LEARNING OBJECTIVES:

The educational objectives of this course are

- To present a problem oriented in depth knowledge of Seminar
- To address the underlying concepts and methods behind Seminar

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Attendance is compulsory in laboratory, which may carries 10 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 20 marks in the overall internal evaluation.
- Surprise Quizzes/Seminar may be conducted and having share of 30 marks in the overall internal evaluation.
- Viva Voce will be conducted at the end of the semester of 100 Marks.

Total Hours (Theory): 00 Total Hours (Lab): 30 Total Hours: 30

DETAILED SYLLABUS

Students will do literature review and prepare a project report on relevant topic and give the presentation.

STUDENTS LEARNING OUTCOME

On successful completion of the course

- The student can identify different areas of of Seminar
- Can find the applications of all the areas in day to day life.

ME MECHANICAL-AUTOMOBILE ENGINEERING DEPARTMENT ELECTIVE-III

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 2nd Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE206-N-A	Subject Title: Automotive Chassis & Body Engineering

Teaching Scheme						Eva	luation Sc	heme		
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- To learn various concepts related to automotive chassis and body engineering
- To have detailed understanding of automotive chassis and body engineering principle to be applied in actual practice.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit	Topics						Lectures	Weigtage				
No							(Hours)	(%)				
1	Car	Body	Details;	Types	of	car	bodies;	visibility;	regulation;,	driver's	6	10

	visibility; methods of improving visibility; safety design; constructional details of roof; under floor; bonnet; boot; wings etc; Classification of coach work.		
2	Vehicle Body Material: conventional material and their manufacturing techniques for auto body. Advance materials and their manufacturing techniques for auto body parts.	6	10
3	Vehicle Aerodynamics ; Objects- vehicle drag and types; various, types of forces and moments; effects of forces and moments; various body optimization techniques for minimum drag; principle of wind tunnel Technology; flow visualization techniques; tests with scale models.	6	10
4	Vehicle Chassis: Introduction, Chassis frame operating and design considerations, Chassis, frame components, sections used, types of joints, Types of chassis frame, Vehicle components location and attachment.	6	10
5	Design of Vehicle Bodies : ; Layout of the design; preliminary design; safety; Idealized structure; Structural surface; shear panel method; symmetric and asymmetrical vertical loads in car; longitudinal loads; different loading situations; load distribution on vehicle structure; Calculation of loading cases; stress analysis of bus body structure under bending and torsion; stress analysis in automobile.	10	20
6	Design of Passenger Vehicle Body (Bus Body): Classification of bus bodies, Based on distance traveled, Based on capacity of the bus and based on style& shape. Types of metal section used in the construction and regulations Construction of conventional and integral type.	6	10
7	Design of Commercial Vehicle Body : Classification of commercial vehicle bodies. Construction of Tanker body and Tipper body. Driver cabin design for compactness Design of frames for bus and commercial vehicles.	5	10
8	Safety Design and Ergonomic Design of Auto Body: Introduction of ergonomics, anthropometric, dimensions of standard occupant, Concept of H- point referencing, design for ergonomics and comfort, seat design for ride comfort, suspension, seats, split frame seating, back passion reducers, dash board instruments, pedal controls and commercial vehicle body. Safety aspects in design, Types of safety (Active and Passive), Safety features: overview of requirement for occupant protection (frontal, side, rear and rollover impact) and pedestrian safety, Airbags and Seatbelts, Visibility Regulation, Driver's visibility, Methods of improving visibility, Introduction of crash test, Chassis and body alignment test	15	20
	Total	60	100

LESSON PLANE

Sr.	Lecture	Course Content	Hrs.
No	No		
1	1	Car Body Details; Types of car bodies; visibility; regulation	1
2	2	Driver's visibility; methods of improving visibility	1
3	3	Safety design	1
4	4	Constructional details of roof	1
5	5	Under floor; bonnet; boot; wings etc	1
6	6	Classification of coach work.	1
7	7	Vehicle Body Material: introduction	1
8	8	Conventional material	1
9	9	Manufacturing techniques for auto body	1
10	10	Manufacturing techniques for auto body	1

11	11	Advance materials and their	1
12	12	Manufacturing techniques for auto body parts.	1
13	13	Vehicle Aerodynamics; Objects- vehicle drag and types; various	1
14	14	Types of forces and moments	1
15	15	Effects of forces and moments	1
16	16	Various body optimization techniques for minimum drag; principle of wind	1
		tunnel Technology	
17	17	Flow visualization techniques	1
18	18	Tests with scale models	1
19	19	Vehicle chassis: introduction,	1
20	20	Chassis frame operating and design considerations, Chassis	1
21	21	Frame components	1
22	22	Sections used, types of joints	1
23	23	Types of chassis frame	1
24	24	Vehicle components location and attachment.	1
25	25	Design of Vehicle Bodies : ; Layout of the design	1
26	26	Preliminary design; safety	1
27	27	Idealized structure	1
28	28	Structural surface; shear panel method	1
29	29	Symmetric and asymmetrical vertical loads in car	1
30	30	Longitudinal loads	1
31	31	Different loading situations	1
32	32	Load distribution on vehicle structure	1
33	33	Calculation of loading cases	1
34	34	Stress analysis of bus body structure under bending and torsion	1
35	35	Stress analysis in automobile	1
36	36	Design of Passenger Vehicle Body (Bus Body): introduction	1
37	37	Classification of bus bodies	1
38	38	Based on distance traveled	1
39	39	Based on capacity of the bus and based on style& shape.	1
40	40	Types of metal section used in the construction and regulations	1
41	41	Construction of conventional and integral type.	1
42	42	Design of Commercial Vehicle Body: introduction	1
43	43	Classification of commercial vehicle bodies.	1
44	44	Construction of Tanker body and Tipper body.	1
45	45	Driver cabin design for compactness	1
46	46	Design of frames for bus and commercial vehicles.	1
47	47	Safety Design and Ergonomic Design of Auto Body: Introduction of ergonomics,	1
48	48	Anthropometric, dimensions of standard occupant,	1
49	49	Concept of H-point referencing, design for ergonomics and comfort, seat design for ride comfort,	1
50	50	Suspension , seats, split frame seating, back passion reducers, dash board instruments,	1
51	51	Pedal controls and commercial vehicle body. Safety aspects in design,	1

52	52	Types of safety (Active and Passive),	1
53	53	Safety features: overview of requirement for occupant protection (frontal, side, rear	1
54	54	Rollover impact) and pedestrian safety, ,	1
55	55	Airbags and Seatbelts	1
56	56	Visibility regulation	1
57	57	Driver's visibility,	1
58	58	Methods of improving visibility,	1
59	59	Introduction of crash test,	1
60	60	Chassis and body alignment test	1
		TOTAL Hrs. Required To complete Task	60

LIST OF ASSIGNMENT/ PRACTICAL

Sr.	Title	Lab
No.		Hrs.
1	Elaborate Car Body parameters and their Details for given car body	2
2	Discuss on Vehicle body materials and their properties.	2
3	Experimental study on Vehicle Aerodynamics	2
4	Design and development of Vehicle Chassis.	2
5	Design and development of Vehicle Bodies.	2
6	Design and development of passenger vehicle Body (Bus body).	4
7	Design and development of Commercial Vehicle body.	4
8	Design consideration for Safety and ergonomic in automobile.	4
9	Represent Case study for adoptive design in automobile.	4
10	Represent Case study on automobile cost for design.	4
	Total	30

STUDENTS LEARNING OUTCOME

After successful completion of the course, student will be able to:

- Understand the basic concept of vehicle aerodynamics
- Understand the car body details
- Understand design of vehicle bodies

TEXT BOOKS

1. J Brown, A J Roberstson, S Serphento, "Motor Vehicle Structure: Concepts and Funtamentals, Butterworth-Heinemann.

REFERENCE BOOKS

- 1. Jnusz Pawlowski, "Vehicle Body Engineering", Business books limited.
- 2. J H Smith, "An Introduction to Modern Vehicle Design", Butterworth-Heinemann.
- 3. J Brown, A J Roberstson, S Serphento, "Motor Vehicle Structure: Concepts and fundamentals, Butterworth-Heinemann.
- 4. Heinz Heizler, "Advanced Vehicle Technology", Butterworth-, London.

- 5. David A. Crolla, "Automobile Engineering :Power train, chassis system and vehicle body",Elsveir
- 6. V D Bhinse, "Ergonomics in Automotive Design", CRC Press.
- 7. SAE J4004
- 8. John Fenton, Handbook of Automotive Body and Systems Design, Wiley India.
- 9. John Fenton, Handbook of Automotive Body Construction and Design Analysis, Wiley India.
- 10. ARAI / GTR for occupant and pedestrian protection.

WEB MATERIALS

- <u>http://www.wikipedia.org</u>
- http://nptel.ac.in/
- <u>www.learnerstv.com</u>

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE206-N-B Subject Title: HYDRAULIC AND PNEUMATIC SYSTEMS

Teaching Scheme						Eval	uation So	heme		
L	т	Р	Total	Total Credit	The	eory	IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

• To understand the importance of HYDRAULICS & PNEUMATIC SYSTEMS in various

engineering applications.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents

Unit No	Topics	Lectures (Hours)	Weightage (%)
1.	Introduction to fluid power – Classification, application of various fluids in engineering, various Symbols used in hydraulic and pneumatic (ISO/JIC), transmission of power at static and dynamic states.	6	15%
2.	Types of hydraulic fluids and their properties, effect of temperature on	10	10%
3.	Hydraulic system elements: Control of fluid power elements, Requirement of pressure control, direction control, flow control valves. Principles of pressure control valves, direction control valves, and pilot operated relief valve, pressure reducing valve, quick exhaust valve, sequence valves. Types of direction control valves – two way two position, four way two position, four way three position, open center, close center, tandem center, manual operated, solenoid, pilot operated direction control valves, check valves . Flow control valves: principle and their types, meter-in and meter-out circuit and flow through circuit. Actuators – linear and rotary, hydraulic motors, types of hydraulic cylinders and their mountings. Calculation of piston velocity, thrust under static and dynamic operation & Application, consideration of friction and inertia loads	12	20%
4.	Hydraulic servo-system for rotary and linear motions.	12	10%
5.	Pneumatic Systems: Application of pneumatics, physical principles, basic requirement of pneumatic system. Comparison with hydraulic systems. Elements of Pneumatics, Air compressors, Pneumatic control valves, Pneumatic actuators – types and the mountings, Air motors – types	8	10%
6.	Pneumatic circuits – Basic pneumatic circuit, impulse operation, speed control, pneumatic motor circuit, sequencing of motion, time delay circuits and their applications.	2	15%
7.	Pneumatic servo-system for linear and rotary motion.	2	05%
8.	Hydraulic Circuit - Basic hydraulic circuit, impulse operation, speed control, Hydraulic motor circuit, sequencing of motion, time delay circuits and their applications.	2	05%
9.	Typical Automotive Applications : Hydraulic tipping mechanism, power steering, fork lift hydraulic gear, hydro-pneumatic suspension (Air suspension), Clutch actuating System, Brakes – Hydraulic AND Pneumatic.	2	05%
10.	Maintenance and trouble shooting of hydraulic & pneumatic circuits.	2	05%
11.	Introduction to fluidics – study of simple logic gates, turbulence, amplifiers, pneumatic sensors and applications.	2	
	Total	60	100%

LESSON PLANNING

Sr.	Lecture	Course Content	Hrs.
No	No		
1	1	Classification, application of various fluids in engineering	1
2	2	Classification, application of various fluids in engineering	1
3	3	Various Symbols used in hydraulic and pneumatic (ISO/JIC)	1
4	4	Various Symbols used in hydraulic and pneumatic (ISO/JIC)	1
5	5	Transmission of power at static and dynamic states.	1
6	6	Requirement of pressure control, direction control, flow control valves	1
7	7	Requirement of pressure control, direction control, flow control valves	1
8	8	Principles of pressure control valves, direction control valves, and pilot operated relief valve	1
9	9	Principles of pressure control valves, direction control valves, and pilot operated relief valve	1
10	10	Pressure reducing valve, quick exhaust valve, sequence valves	1
11	11	Types of direction control valves – two way two position, four way two position, four way three position.	1
12	12	Open center, close center, tandem center, manual operated, solenoid, pilot operated direction control valves, check valves	1
13	13	Flow control valves: principle and their types, meter-in and meter-out circuit and flow through circuit.	1
14	14	Flow control valves: principle and their types, meter-in and meter-out circuit and flow through circuit.	1
15	15	Actuators – linear and rotary, hydraulic motors, types of hydraulic cylinders and their mountings.	1
16	16	Actuators – linear and rotary, hydraulic motors, types of hydraulic cylinders and their mountings.	1
17	17	Calculation of piston velocity, thrust under static and dynamic operation & Application, consideration of friction and inertia loads.	1
18	18	Calculation of piston velocity, thrust under static and dynamic operation & Application, consideration of friction and inertia loads.	1
19	19	Calculation of piston velocity, thrust under static and dynamic operation & Application, consideration of friction and inertia loads.	1
20	20	Hydraulic servo-system for rotary and linear motions.	1
21	21	Pneumatic Systems: Application of pneumatics, physical principles, basic	1
		requirement of pneumatic system.	
22	22	Pneumatic Systems: Application of pneumatics, physical principles, basic	1
23	23	Comparison with hydraulic systems. Elements of Pneumatics, Air compressors, Pneumatic control valves,	1

24	24	Comparison with hydraulic systems. Elements of Pneumatics, Air	1
		compressors, Pneumatic control valves,	
25	25	Pneumatic actuators – types	1
		And the mountings, Air motors – types	
26	26	Pneumatic actuators – types	1
		And the mountings, Air motors – types	
27	27	Pneumatic actuators – types	1
		And the mountings, Air motors – types	
28	28	Pneumatic circuits – Basic pneumatic circuit, impulse operation, speed	1
		control, pneumatic motor circuit, sequencing of motion, time delay	
		circuits and their applications.	
29	29	Pneumatic circuits – Basic pneumatic circuit, impulse operation, speed	1
		control, pneumatic motor circuit, sequencing of motion, time delay	
		circuits and their applications.	
30	30	Pneumatic circuits – Basic pneumatic circuit, impulse operation, speed	1
		control, pneumatic motor circuit, sequencing of motion, time delay circuits	
		and their applications.	
31	31	Pneumatic servo-system for linear and rotary motion.	1
32	32	Pneumatic servo-system for linear and rotary motion.	1
33	33	Hydraulic Circuit - Basic hydraulic circuit, impulse operation, speed control	1
34	34	Hydraulic Circuit - Basic hydraulic circuit, impulse operation, speed control	1
35	35	Hydraulic Circuit - Basic hydraulic circuit, impulse operation, speed control	1
36	36	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their Application.	
37	37	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their Application.	
38	38	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their Application.	
39	39	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their Application.	
40	40	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their applications. Hydraulic motor circuit, sequencing of motion, time	
		delay circuits and their	
		Applications.	
41	41	Hydraulic motor circuit, sequencing of motion. time delay circuits and	1
		their applications. Hydraulic motor circuit, sequencing of motion, time	
		delay circuits and their	
		Applications.	
42	42	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their applications. Hydraulic motor circuit, sequencing of motion, time	

		TOTAL Hrs. Required To complete Task	60
60	60	Introduction to fluidics amplifiers, pneumatic sensors and applications.	1
59	59	Introduction to fluidics – study of simple logic gates, turbulence.	1
58	58	Maintenance and trouble shooting of hydraulic & pneumatic circuits.	1
57	57	Maintenance and trouble shooting of hydraulic & pneumatic circuits.	1
56	56	Maintenance and trouble shooting of hydraulic & pneumatic circuits.	1
55	55	Maintenance and trouble shooting of hydraulic & pneumatic circuits.	1
54	54	Brakes – Hydraulic AND Pneumatic.	1
64	E4	Brakes – Hydraulic AND Pneumatic.	1
53	53	Hydro-pneumatic suspension (Air suspension), Clutch actuating System,	1
52	52	Hydro-pneumatic suspension (Air suspension), Clutch actuating System, Brakes – Hydraulic AND Pneumatic	1
51	51	Examples on rakes	1
50	50	Examples on clutch	1
		steering, fork lift hydraulic gear	
49	49	Typical Automotive Applications: Hydraulic tipping mechanism, power	1
48	48	Typical Automotive Applications: Hydraulic tipping mechanism, power	1
		their applications.	
47	47	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
	_	their applications.	-
46	46	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
45	45	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their applications.	
44	44	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		their applications. Hydraulic motor circuit, sequencing of motion, time delay circuits and their applications.	
43	43	Hydraulic motor circuit, sequencing of motion, time delay circuits and	1
		Applications.	
		delay circuits and their	

LIST OF EXPERIMENTS

SR NO	ΤΟΡΙϹ	LAB HOURS.
1	To study about Introduction to fluid power and their properties.	2
2	To study about Types of hydraulic fluids and their properties	2

3	To study about Hydraulic system elements and Control of fluid power elements.	2
4	To study about Pneumatic Systems and Application.	2
5	To study about Pneumatic circuits and Hydraulic Circuit	2
6	To study about Automotive Applications and maintenance.	2
7	To study about fluidics and sensors.	2

STUDENT LEARNING OUTCOME

- The student can identify different areas of subject.
- Can find the applications of all the areas in day to day life.

RECOMMANDED STUDY MATERIAL

- 1. Hydraulic & pneumatics- Andrew Parr-Jaico Publishing House.
- 2. Basic fluid power- by D.A. Pease-PHI
- 3. Industrial Hydraulic & pneumatics J.J. Pippenger McGraw Hill
- 4. Fluid Power with applications A. Esposito- PHI
- 5. Oil Hydraulics B Lal- Intl- Literature
- 6. Fluid power Design Hand book Yeaple
- 7. Industrial Hydraulic Manual Vicker Sperry
- 8. Practical guide to Fluid Power H.S. Stewart

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 2nd Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

	Teaching	scheme			Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

• At the end of the course; the students will be able to acquire basic knowledge on automobile part designing using design software.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Sr No	Content	Total Hrs	Weightage
			(%)
1	INTRODUCTION:		
	Introduction to Automobile CAD software's; Generation of software's;	8	10
	History of CAD/CAM/CAE; industrial looks on CAD softwares;		
	Introduction to CIM ; Historical development.		
2	SKETCHER & AUTO CONSTRAINTS:		
	Introduction to Sketching tools like Line; Rectangular; Circle; Arc;	8	20
	Splines; and Fillet etc to built complex profiles; general concept and best	0	20
	process to constraint (Auto and Manually) a profile in Creo and		
	SolidEdge.		
3	PART DESIGN FUNDAMENTALS:		
	Introduction to Design tools like Extrude; Revolve; Shell; Pad etc needed	12	20
	to generate solid models using various software; Material addition and	12	20
	subtraction about axis and plane; types of geometrical dimensional		
_	limits; numerous approaches to specify solid feature creation.		
4	ASSEMBLY DESIGN FUNDAMENTALS:		
	Design tools needed to create and manage assemblies and sub	12	10
	assemblies; analyzing and modeling an assembly; designing in context;		
	process to insert parts from given and maintained catalogue.		
5	GENERATIVE SURFACING AND OPERATION:		
	Introduction to Surface; Surface modeling tools like Datum points;	10	20
	Datum curves; Splines etc; Surface operation tools like boundary; trim;		
6	split etc used to create final surface products.		
6	SHEET METAL DESIGN:		
	reating walls: creating flange: Hom: Tear: Drop: Swept: Folded and Up	5	10
	Ended view: creating a cut out: splitting geometry: stamping features:		
	creating a punch wish a die		
7			
,	introduction to EMS components: Type of EMS: planning for EMS:	Е	10
	advantages and applications for conventional process planning type of	5	10
	CAPP: stens in variant process planning for CAPP		
	τοται	60	100

LESSON PLANNING

Sr.	LECTURE NO	Course Content	Hrs.
No			
1	1	INTRODUCTION: Introduction to Automobile CAD software's;	1
2	2	Generation of software's	1
3	3	Generation of software's	1
4	4	History of CAD/CAM/CAE	1

5	5	CAD softwares	1
6	6	Industrial looks on CAD softwares	1
7	7	Introduction to CIM	1
8	8	Historical development of CIM	1
9	9	Introduction Sketcher & Auto Constraints:	1
10	10	Brief study of Sketcher & Auto Constraints	1
11	11 Sketching tools like Line; Rectangular		1
12	12	Sketching tools of Circle; Arc; Splines	1
13	13	Fillet etc to built complex profiles; general concept	1
14	14Best process to constraint (Auto and Manually) a profile in Creo and SolidEdge.		1
15	15 general concept and best process to constraint (Auto and Manually) a profile in Creo and SolidEdge.		1
16	16Best process to constraint (Auto and Manually) a profile in Creo and SolidEdge.		1
17	17	Introduction of Part Design Fundamentals	1
18	18	8 Study of Part Design Fundamentals	
19	19 Study of Part Design Fundamentals		1
20	20	Introduction to Design tools like Extrude; Revolve; Shell	1
21	21	Pad etc needed to generate solid models using various software	1
22	22	Pad etc needed to generate solid models using various software	1
23	23	Material addition and subtraction about axis and plane;	1
24	24	Material addition and subtraction about axis and plane;	1
25	25	types of geometrical dimensional limits	1
26	26	types of geometrical dimensional limits	1
27	27	Numerous approaches to specify solid feature creation	1
28	28	Numerous approaches to specify solid feature creation	1
29	29	Introduction of Assembly Design Fundamentals	1
30	30	Study of Assembly Design Fundamentals	1
31	31	Design tools needed to create and manage assemblies and sub assemblies	1

32	32	Design tools needed to create and manage assemblies and sub assemblies	1
33	33	analyzing and modeling an assembly	1
34	34	analyzing and modeling an assembly	1
35	35	designing in context	1
36	36	designing in context	1
37	37	designing in context	1
38	38	process to insert parts from given and maintained catalogue	1
39	39	process to insert parts from given and maintained catalogue	1
40	40	40 process to insert parts from given and maintained catalogue	
41	41 Introduction GENERATIVE SURFACING AND OPERATION:		1
42	42 Introduction to Surface and Surface modeling tools		1
43	43	43 Surface and Surface modeling tools	
44	44	44 Surface and Surface modeling tools	
45	45 Surface modeling tools - Datum point		1
46	46 Surface modeling tools - Datum curves; Splines etc;		1
47	47	Surface operation tools -boundary;	1
48	48	Surface operation tools - trim;	1
49	49	Surface operation tools -split etc used to create final surface products	1
50	50	Various operation tools	1
51	51	Sheet Metal Design: Introduction to sheet metal;	1
52	52	sheet metal bending; bend allowance;	1
53	53	creating walls; creating flange; Hem; Tear; Drop; Swept;	1
54	54	Folded and Un-Folded view; creating a cut out; splitting geometry	1
55	55	Stamping features; creating a punch wish a die	1
56	56	COMPUTER AIDED PROCESS PLANNING: introduction to FMS components	1
57	57	Type of FMS	1
58	58	planning for FMS	1
59	59	advantages and applications for conventional process planning	1

60	60	type of CAPP, steps in variant process planning for CAPP	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL :

- 1. Complete Modeling of cotter and knuckle joint and its assembly drawing
- 2. Computer aided design of leaf springs; coil spring and torsion bar springs using SolidEdge/Creo.
- 3. Design of propeller shaft and its assembly drawing by using drafting software.
- 4. Modeling of collar bearings assembly using SolidEdge/Creo.
- 5. Modeling piston-cylinder assembly and drawing its assembly using SolidEdge/Creo.
- 6. Modeling a flywheel and drawing it by using SolidEdge/Creo.
- 7. Modeling a connecting rod and draw it by using SolidEdge/Creo.
- 8. Modeling a connecting rod and crankshaft assembly using SolidEdge/Creo.
- 9. Computer aided design of frame for passenger using SolidEdge/Creo.
- 10. Computer aided design of frame for commercial vehicle using SolidEdge/Creo.
- 11. Computer aided design of front axle using SolidEdge/Creo.

STUDENTS LEARNING OUTCOME

After successful completion of the course, the student will be able to

- Understand the concepts of CAD/CAM/CAE.
- Understand the concept of design of automotive components.
- Understand the concepts of surfacing.
- Understand and carry out curvature analysis.
- Get acquainted with various CAD suits and design tool methods.
- Learn fundamentals of CIM.

TEXT BOOKS & REFERENCE BOOKS

- 1. Ibrahim, Zeid and R. Siva Subramanian., "CAD/CAM", Tata McGraw-Hill 2007.
- 2. Rao, P. N. and Tiwari, N. K., "Computer Aided Manufacturing", Tata McGraw-Hill 2008.
- 3. Groover, Mikell P., "CAD/CAM", Pearson Education; 2008.
- 4. Shyam and Tickoo Maini., "Engineers Designing"

WEB MATERIALS

- http://www.wikipedia.org
- http://nptel.ac.in
- http://ocw.mit.edu

ME MECHANICAL-AUTOMOBILE ENGINEERING DEPARTMENT ELECTIVE-IV

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

2nd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE207-N-ASubject Title: ADVANCED AIR CONDITIONING (IN COMMON WITH
METH)

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs Mark		Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- To learn various concepts related to vehicle dynamics
- To have detailed understanding of vehicle dynamics principle to be applied in actual practice.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Unit No	Topics	Lectures (Hours)	Weightage (%)
1.	Psychometric charts : ASHRE and CARRIER charts ,their differences ,application of corrections of different charts Applied Psychrometry : Combinations of different processes and their representation on psychrometric charts, psychrometric calculations for cooling and dehumidification .High latent heat load ,dehumidified air quantities based on total and effective room loads ,GSHF and ESHF ,effect of fan and duct heat gain or dehumidified air quantity ,effective surface temperature ,effect of bypass factor on GSHF, analysis for using all outside air ,psychrometric of partial load control	6	15%
2.	Cooling tower: Different types, construction working performance, testing different types of desert coolers, testing of desert coolers as per BIS, Air washer, different types, construction performance.	4	10%
3.	Heat gain calculations: choices of supply conditions. Solar heat gain: Terminology calculation different solar angles ,relation between different angles ,calculation of the intensity of direct ,diffused and ground radiation solar air temperature ,empirical methods to evaluate heat transfer through walls, and roofs, TETD and its determination by calculation and tables ,Heat gain through glass ,Solar heat gain factor, use of equations and tables ,shading of glass ,solar chart and its use .shading of glass ,solar chart and its use, shading devices and its selection,load due to other sources, stack effect ,different methods of calculating cooling load as per ASHREsomebrief idea(other than TETD methods)	8	10%
4.	Duct Design : Types of ducts ,duct construction ,factors affecting duct construction, friction charts and othercorrection factors ,losses ,design velocity and its selection, duct heat gain or loss ,duct insulation ,duct layouts,duct sizing methods, equal friction static regains and T-method design simple idea .Noise and their isolation, ductmaterials and their accessories	6	10%
5.	Air Distribution: Terminology, outlet performance, types of outlets, location of outlets,factors affecting grill performance, selection of outlets using nomographs, tables and line charts ,room air diffusions, performance index (ADPI) and its use in outlet selection ,use of different equations.	6	10%
6.	Air conditioning systems: Factors affecting the selection of the systems, classification, systems, design procedure, system features, psychrometric analysis, controls of all air, air water, all water, DX ,VAV and dual duct systems basic idea of cold air distributions systems and dessicant cooling systems	6	10%
7.	Thermal effects :-Human thermo regulation, different equations governing thermal exchanges, factors affecting comforts, environmental indices, AQ and its importance –Human comfort and health.	6	10%

8.	Air conditioning controls : Characteristics of HVAC noise ,Acoustical rating systems and criteria ,RC ,NC, and NR criteria for noise rating ,noise control methods for VAV units ,cooling towers, air devices roof top units ,chillers ,pumps, AHU rooms, compressors.	6	10%
9.	Air handling systems: Fans, types ,construction performance characteristics ,fan laws ,testing as per BS ,IS and AMCA standards, fan selection with the help of tables charts and curves, fan drive arrangements and discharge from fans, duct design fan selection etc.	8	10%
10.	Advances in Air Conditioning, Clean Room Concept, Filtration of suspended particles, PPM Control and methods, Types of Filters, Mechanical, UV filters etc.	4	05%
	Total	60	100%

LESSON PLANNING

Sr. No	r. No LECTURE Course Content		Hrs.	
	NO			
1	1	Psychometric charts : ASHRE and CARRIER charts , their differences ,	1	
2	2	Different major & minor services for engine,	1	
3	3	Combinations of different processes and their representation on psychrometric charts, psychrometric calculations for cooling and dehumidification.	1	
4	4	High latent heat load ,dehumidified air quantities based on total and effective room loads ,	1	
5	5	GSHF and ESHF , effect of fan and duct heat gain or dehumidified air quantity , effective surface temperature , effect of bypass factor on GSHF,	1	
6	6	Analysis for using all outside air ,psychrometric of partial load control	1	
7	7	Cooling tower: Different types, construction working performance,	1	
8	8	Testing different types of desert coolers,	1	
9	9	Testing of desert coolers as per BIS, Air washer,	1	
10	10	Different types, construction performance.	1	
11	11	Heat gain calculations: choices of supply conditions. Solar heat gain: Terminology calculation different solar angles ,relation between different angles	1	
12	12	Calculation of the intensity of direct	1	
13	13	Diffused and ground radiation solar air temperature	1	
14	14	Empirical methods to evaluate heat transfer through walls, and roofs	1	
15	15	TETD and its determination by calculation and tables ,Heat gain through glass	1	

16	16	Solar heat gain factor, use of equations and tables ,shading of glass ,solar chart and its use	1
17	17	Shading devices and its selection, load due to other sources, stack effect	1
18	18	Different methods of calculating cooling load as per ashresomebrief	1
19	19	Different methods of calculating cooling load as per as hresomebrief idea(other than TETD methods)	1
20	20	Factors affecting duct construction,	1
21	21	Friction charts and othercorrection factors ,	
22	22	Losses , design velocity and its selection,	1
23	23	Duct heat gain or loss ,duct insulation ,duct layouts,duct sizing methods, equal friction static regains and T-method design simple idea	1
24	24	Noise and their isolation, ductmaterials and their accessories	1
25	25	Air Distribution: Terminology, outlet performance	1
26	26	Types of outlets, location of outlets	1
27	27	Factors affecting grill performance	1
28	28	Selection of outlets using nomographs	1
29	29	Tables and line charts ,room air diffusions	1
30	30	Performance index (ADPI) and its use in outlet selection , use of different equations.	1
31	31	Air conditioning systems: Factors affecting the selection of the systems	1
32	32	Classification, systems, design procedure	1
33	33	, System features, psychrometric analysis	1
34	34	Controls of all air	1
35	35	Air water, all water, DX	1
36	36	VAV and dual duct systems basic idea of cold air distributions systems and dessicant cooling systems	1
37	37	Thermal effects :-Human thermo regulation,	1
38	38	Human thermo regulation	1
39	39	Different equations governing thermal exchanges	1
40	40	Factors affecting comforts	1
41	41	Environmental indices	1
42	42	AQ and its importance –Human comfort and health	1
43	43	Air conditioning controls : Characteristics of HVAC noise	1
L			L

44	44	Acoustical rating systems and criteria	1
45	45	RC ,NC, and NR criteria for noise rating	1
46	46	Noise control methods for VAV units	1
47	47	Cooling towers, air devices roof top units ,chillers ,pumps	1
48	48 48 AHU rooms, compressors.		1
49	49	Air handling systems: Fans, types	1
50	50	Construction performance characteristics ,fan laws	1
51	51	Construction performance characteristics ,fan laws	1
52	52	Testing as per BS	1
53	53	IS and AMCA standards	1
54	54	Fan selection with the help of tables charts and curves	1
55	55	Fan drive arrangements and discharge from fans,	1
56	56	Duct design fan selection etc	1
57	57	Advances in Air Conditioning, Clean Room Concept,	1
58	58	Filtration of suspended particles	1
59	59	PPM Control and methods	1
60	60	Types of Filters, Mechanical, UV filters etc.	1
		TOTAL Hrs. Required To complete Task	60

LIST OF EXPERIMENTS

Sr.	Title	Lab Hrs.
No.		
1	Experiment based on air conditioning test rig and plots various processes.	04
2	Experiment based on air conditioning for automobile.	04
3	Performance and analysis of air conditioning system.	02
4	Experiment based on refrigerants used in automobile air conditioning.	02
5	Experiment based on air distribution system for automobile.	04
6	Design of air conditioning system and load calculation for automobile.	04

7	Experiment based on air conditioning system components.	02
8	Experiments based on air conditioning services for automobile.	04
10	Experiment based on air conditioning controls.	04
	Total Hrs	30

STUDENT LEARNING OUTCOME

- The student can identify different areas of Automobile air conditioning
- Can find the applications of all the areas in day to day life.

RECOMMANDED STUDY MATERIAL

TEXT & REFERENCE BOOKS

- 1. "Automotive Air-Conditioning", by Crouse & Anglin Mc Graw Hill Pub.
- 2. "Automotive Air-Conditioning", by Paul Weiser Reston Publishing Co.
- "Automatic Heating & Air Conditioning Systems" Mitchell Information Services.
- 4. "Air Conditioning", by Paul Lang, C.B.S. Publisher & Distributor, Delhi.
- 5. Principles of Refrigeration by Roy J. Dossat Pearson Publication.
- 6. "Modern Air Conditioning", by Harris.
- 7. "Automobile Engg", by Anil Chhikara Satya Prakashan.
- "American Society of Heating, Refrigeration & Air Conditioning Fundamentals", ASHRAE Handbook – 1985

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 2nd Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE207-N-B Sub	bject Title: Automotive Manufacturing
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Teaching Scheme						Eva	luation Sc	heme		
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- The Automotive manufacturing course is to learn the basic processes available to make a part/product.
- It Will help the students to select the best manufacturing process based on quality/time/cost/ mechanical properties.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Sr No	Content		Weightage
			(%)
1	MEATAL FORMING: Objective-Elastic and Plastic deformation of Metals- stress and strain curve-anisotropy in yielding. Hot and Cold working. Forging of metals- Forging processes- Forging machines- Forging load analysis- Forging defects. Drawing of rods, wires and tubes. Extrusion- load in Extrusion process-lubrication in Extrusion-defect in Extrusion. Rolling-process- Rolling mills-forces and geometrical relationships in rolling-defects in Rolling. Sheet metal forming-shearing processes- clearance-shearing forces-penetration-reduction in press load-shearing operations-strip lay out, Bending, stretch forming, Drawing processes.	16	29
2	LOCATING AND CLAMPING PRINCIPLES: Objectives of tool design- Function and advantages of Jigs and fixtures – Basic elements– principles of location – Locating methods and devices – Redundant Location–Principles of clamping – Mechanical actuation – pneumatic and hydraulic actuation Standard parts – Drill bushes and Jig buttons – Tolerances and materials used. JIGSANDFIXTURES:- Design and development of jigs and fixtures for given component-Types of Jigs– Post, Turnover, Channel, latch, box, pot, angular post jigs–Indexing jigs– General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.	10	18
3	JOINING PROCESS: Joining techniques like welding, riveting, brazing, soldering used for sheet metal components, chassis frame components. Welding processes like spot, tungsten inert gas welding, metal inert gas welding, shielded metal arc welding, submerged arc welding , friction and electro-slag welding, electro beam welding, laser welding ,ultrasonic welding. Welding defects , Gas welding and cutting, Plasma arc cutting.	10	18
4	METAL CASTING PROCESSES: Patterns, Types of patterns, allowances and material used for patterns, moulding materials, moulding sands, Moulding sands properties and sand testing: Grain fineness, moisture content, clay content and permeability test. Core materials and core making. Moulding practices: Green, dry and loam sand moulding, pit and floor moulding; shell moulding; permanent moulding; carbon dioxide moulding. Metal casting: Melting furnaces: Rotary, Pit electric, Tilting and cupola. Review of casting processes, casting design considerations, capabilities and applications of casting processes; Gating and Rising design fundamentals, permanent mould casting, pressure die casting, centrifugal casting, continuous casting casting defects.	12	21
5	ADVANCED MANUFACTURING PROCESSES: Use of EDM, ECM, ECG, USM, PAM, LBM for manufacturing of automobile components. Super Finishing Processes: Introduction to Grinding, Lapping, Honning, Buffing, Barrel Tumbling, Burnishing, Powder coating, Polishing.	12	14
	TOTAL	60	100

LESSON PLANNING

Sr.	LECTURE NO	Course Content	Hrs.
No			
1	1	Introduction of Meatal Forming	1
2	2	Objective-Elastic and Plastic deformation of Metals-stress and	1
		strain curve-anisotropy in yielding.	
3	3	Hot and Cold working	1
4	4	Forging of metals and Forging processes	1
5	5	Forging machines	1
6	6	Forging load analysis	1
7	7	Forging defects	1
8	8	Drawing processes	1
9	9	Drawing of rods, wires and tubes.	1
10	10	Extrusion-load in Extrusion process	1
11	11	-lubrication in Extrusion-defect in Extrusion	1
12	12	Rolling-process- Rolling mills-forces and geometrical relationships in rolling-defects in Rolling.	1
13	13	Sheet metal forming-shearing processes-clearance-shearing forces-	1
14	14	penetration-reduction in press load-	1
15	15	shearing operations-strip lay out,	1
16	16	Bending, stretch forming	1
17	17	Introduction of Locating And Clamping Principles	1
18	18	Objectives of tool design	1
19	19	Function and advantages of Jigs and fixtures – Basic elements–	1
20	20	principles of location – Locating methods and devices – Redundant Location–	1
21	21	Principles of clamping, Mechanical actuation – pneumatic and hydraulic actuation Standard parts – Drill bushes and Jig buttons – Tolerances and materials used.	1
22	22	JIGSANDFIXTURES:- Design and development of jigs and fixtures for given component	1

23	23	Types of Jigs–Post, Turnover, Channel, latch, box, pot, angular post jigs–Indexing jigs–General principles of milling.	1
24	24	Lathe, boring fixtures – Assembly	1
25	25	broaching and grinding fixtures – Assembly	1
26	26	Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.	1
27	27	Introduction of Joining Process	1
28	28	Joining techniques like welding, riveting, brazing, soldering used for sheet metal components, chassis frame components.	1
29	29	Welding processes like spot, tungsten inert gas welding	1
30	30	metal inert gas welding, shielded metal arc welding	1
31	31	submerged arc welding	1
32	32	friction and electro-slag welding,	1
33	33	Electro beam welding, laser welding	1
34	34	ultrasonic welding	1
35	35	Welding defects	1
36	36	Gas welding and cutting, Plasma arc cutting	1
37	37	METAL CASTING PROCESSES:	1
38	38	Patterns, Types of patterns	1
39	39	allowances and material used for patterns,	1
40	40	moulding materials,	1
41	41	moulding sands, Moulding sands properties and sand testing: Grain fineness, moisture content, clay content and permeability test	1
42	42	Core materials and core making	1
43	43	Moulding practices: Green, dry and loam sand moulding,	1
44	44	pit and floor moulding; shell moulding; permanent moulding; carbon dioxide moulding	1
45	45	Metal casting: Melting furnaces: Rotary, Pit electric, Tilting and cupola.	1
46	46	Review of casting processes, casting design considerations, capabilities and applications of casting processes:	1
47	47	Gating and Rising design fundamentals, permanent mould casting,	1
48	48	pressure die casting, centrifugal casting, continuous casting, casting defects.	1
49	49	Introduction of Advanced Manufacturing Processes	1
50	50	Use of EDM for manufacturing of automobile components	1
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51	51	ECM for manufacturing of automobile components	1
52	52	ECG for manufacturing of automobile components	1
53	53	USM and PAM for manufacturing of automobile components	1
54	54	LBM for manufacturing of automobile components	1
55	55	Super Finishing Processes: Introduction to Grinding,	1
56	56	Lapping,	1
57	57	Honning,	1
58	58	Buffing, Barrel Tumbling	1
59	59	Burnishing,	1
60	60	Powder coating, Polishing.	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL:

- 1. To exercise the pattern allowances and to make the drawing of pattern of given automotive part.
- 2. To exercise the investment and centrifugal casting and casting defects.
- 3. To exercise the resistance welding and TIG welding and its applications in automotive industry.
- 4. To exercise the non conventional machining and its applications in automotive industry.
- 5. To make the strip lay out of given sheet metal part of an auto vehicle.
- 6. To calculate the punch and die size of given part.
- 7. To design and draw the JIG and FIXTURE of given automotive component.
- 8. To find the no of drawing stages to make the given part by deep drawing method

STUDENTS LEARNING OUTCOME

After successful completion of the course, the student will be able to

- Identify and select the methods of forging for gudgeon pin, Crankshaft, connecting rod, camshaft, rocker arm, gears, shaft & axles, material suitability for above components, forging equipments, forging defects.
- Identify and select the Joining techniques like welding, riveting, brazing, soldering used for sheet metal components, chassis frame components and care to be taken during the operation.

- Select the non-conventional machining like EDM, ECM, ECG, USM, PAM,, LBM for manufacturing automobile components.
- Identify and select the sheet metal working methods for body components, wheel disc, different covers, fuel tanks, chassis frame components.
- Identify the proper casting method for engine cylinder, cylinder head etc.
- Design the jig and fixture for given component.
- Design press tool die for given component and optimize the strip lay out for given sheet metal component.
- Design the pattern and select the moulding and casting method for given automotive component.

TEXT BOOKS & REFERENCE BOOKS

- 1. Manufacturing Engineering And Technology By S. Kalpakjian, Pearson.
- 2. Manufacturing Processes, Kalpakjian, Pearson
- 3. Degarmon's Materials and Processes in Manufacturing, 11th Ed. Black, Ronald A Kohser, Wiley India
- 4. Manufacturing Processes and Systems, 9th Ed. Phillip F., Ostwald, Jairo Munoz, Wiley India
- 5. Production technology, by R.K. Jain, Khanna publishers.
- 6. Production Technology by P.C. Sharma S Chand & Co Ltd.
- 7. Manufacturing Technology Vol. II, By P.N. Rao, Tata McGraw Hill.
- 8. Welding Technology, by O. P. Khanna, Dhanpat Rai publishers.
- 9. Joshi, P.H. "Jigs and Fixtures", Second Edition, Tata McGraw Hill Publishing Co., Ltd.,New Delhi, 2004.
- 10. Joshi P.H "Press tools Design and Construction", wheels publishing, 1996
- 11. K. Venkataraman, "Design of Jigs Fixtures & Press Tools", Tata McGraw Hill, New Delhi, 2005.
- 12. Donaldson, Lecain and Goold "Tool Design", III rd Edition Tata McGraw Hill, 2000.
- 13. Kempster, "Jigs and Fixture Design", Hoddes and Stoughton Third Edition 1974
- 14. Hoffman "Jigs and Fixture Design" Thomson Delmar Learning, Singapore, 2004.
- 15. ASTME Fundamentals of Tool Design Prentice Hall of India.

WEB MATERIALS

- http://www.wikipedia.org
- http://nptel.ac.in
- http://ocw.mit.edu

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 2nd Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE207-N-C	Subject Title: Advanced Automotive Aerodynamics
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	Teaching	scheme			Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- Explain the concept of bluff body
- Analysis of aerodynamics in automotives
- Utilizing appropriate safety procedures with maintenance & service.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Sr No	Content	Total Hrs	Weightage
			(%)
1	The concept of bluff body; Analysis of aerodynamic drag force; types of	_	
	drag force; drag coefficient of cars; strategies for aerodynamic	7	10
	development; low drag profiles for vehicle.		
2	Aerodynamic shape analysis; Front and modification; front and rear		
	wind shield angle; boat tailing; hatch back, fast back and square back;	12	20
	dust flow patterns at the rear; effect of gap configuration.		
3	The concept of vehicle safety; Need of safety; active safety: driving		
	safety; conditional safety; perceptibility safety; operating safety- passive	15	25
	safety: exterior safety, interior safety, deformation behavior of vehicle		
	body.		
4	Regulations, automatic seat belt Tightener system; Collapsible steering	12	15
	column; Tiltable steering wheel.		
5	Electronic system for activating air bags; Bumper design for safety;	7	20
	antiskid braking system.		
6	Speed control devices; Causes of rear end collision; Frontal object	_	
	detection; Rear vehicle object detection system; Object detection	7	10
	system with braking system interactions.		
	TOTAL	60	100

LESSON PLANNING

Sr.	LECTURE NO	Course Content	Hrs.
No			
1	1	The concept of bluff body	1
2	2 Analysis of aerodynamic drag force; types of drag force		1
3	3	Analysis of aerodynamic drag force; types of drag force	1
4	4	drag coefficient of cars	1
5	5	drag coefficient of cars	1
6	6	strategies for aerodynamic development	1
7	7	low drag profiles for vehicle	1
8	8	Introduction of Aerodynamic shape analysis	1
9	9	Aerodynamic shape analysis: Front end modification	1
10	10	Aerodynamic shape analysis: Front end modification	1

11	11	Aerodynamic shape analysis: front and rear wind shield angle	1
12	12	Aerodynamic shape analysis: front and rear wind shield angle	1
13	13	Aerodynamic shape analysis: boat tailing	1
14	14	Aerodynamic shape analysis: hatch back	1
15	15	Aerodynamic shape analysis: fast back and square back	1
16	16	Aerodynamic shape analysis: fast back and square back	1
17	17	Aerodynamic shape analysis: dust flow patterns at the rear	1
18	18	Aerodynamic shape analysis: dust flow patterns at the rear	1
19	19	Aerodynamic shape analysis: effect of gap configuration	1
20	20	The concept of vehicle safety	1
21	21	Need of safety	1
22	22	The concept of active safety	1
23	23	driving safety	1
24	24	conditional safety	1
25	25	perceptibility safety	1
26	26	perceptibility safety	1
27	27	operating safety	1
28	28	The concept of passive safety	1
29	29	exterior safety	1
30	30	exterior safety	1
31	31	interior safety	1
32	32	interior safety	1
33	33	deformation behavior of vehicle body	1
34	34	deformation behavior of vehicle body	1
35	35	Regulations	1
36	36	Regulations	1
37	37	Regulations	1
t			

38	38	automatic seat belt Tightener system	1
39	39	automatic seat belt Tightener system	1
40	40	automatic seat belt Tightener system	1
41	41	Collapsible steering column	1
42	42	Collapsible steering column	1
43	43	Collapsible steering column	1
44	44	Tiltable steering wheel	1
45	45	Tiltable steering wheel	1
46	46	Tiltable steering wheel	1
47	47	Electronic system for activating air bags	1
48	48	Electronic system for activating air bags	1
49	49	Bumper design for safety	1
50	50	Bumper design for safety	1
51	51	Antiskid braking system	1
52	52	Antiskid braking system	1
53	53	Antiskid braking system	1
54	54	Introduction of Speed control devices	1
55	55	Causes of rear end collision;	1
56	56	Frontal object detection;	1
57	57	Rear vehicle object detection system	1
58	58	Rear vehicle object detection system	1
59	59	Object detection system with braking system interactions	1
60	60	Object detection system with braking system interactions	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL:

1. Study of bluff body, aerodynamic drag in automobile and safety considerations while designing the automobile body

- 2. Study of wind tunnel and determination of drag coefficient of any model of automotive vehicles.
- 3. Study of dust flow patterns at the rear in automotive vehicles.
- 4. Study of Bumper design for safety
- 5. Study of advanced automobile seat belts and Air bag systems.
- 6. Study of advanced steering wheel and steering system.
- 7. Study anti-skid braking system and antilock brake system.
- 8. Study rear vehicle object detection system.
- 9. Study of central door locking systems

STUDENTS LEARNING OUTCOME

After successful completion of the course, the student will be able to

- Understand the concept of bluff body and aerodynamic drag force analysis.
- Do Analysis of Aerodynamic Shape
- Understand Concept of Vehicle Safety
- Understand Working of Various safety equipment and safety regulations.

TEXT BOOKS & REFERENCE BOOKS

- 1. Hucho, W.H., Aerodynamics of Road vehicles, Butterworths Co. Ltd., 1997.
- 2. J.Powloski "Vehicle Body Engineering" Business books limited, London 1969.

3. Ronald.K.Jurgen - "Automotive Electronics Handbook" - Second edition- McGraw-HillInc., -1999.

4. ARAI Safety standards.

WEB MATERIALS

- http://www.wikipedia.org
- http://nptel.ac.in
- http://ocw.mit.edu
- http://www.cfd-online.com

ME MECHANICAL-AUTOMOBILE ENGINEERING SEMESTER-3

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

3rd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE301-N	Subject Title: ENERGY CONSERVATION AND MANAGEMENT
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	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVE

- To present a problem oriented in depth knowledge of Energy conservation
- To address the underlying concepts and methods behind Energy conservation management

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Unit No	Topics	Lecture (Hours)	Weigtage (%)
1	Energy Scenario: Classification of Energy, Indian energy scenario, Sectorial energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy scenario, energy pricing, energy security, energy conservation and its importance, energy strategy for the future.	4	5%
2	Energy Conservation Act 2001 and Related Policies : Energy conservation Act 2001 and its features, notifications under the Act, Schemes of Bureau of Energy Efficiency (BEE) including Designated consumers, State Designated Agencies, Electricity Act 2003, Integrated energy policy, National action plan on climate change, ECBC code for Building Construction.	6	10%
3	Financial Management and Energy Monitoring and Targeting: Investment-need, appraisal and criteria, financial analysis techniques simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of Energy Service Companies (ESCOs)	6	15%
4	Energy Monitoring and Targeting: Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques – energy consumption, production, cumulative sum of differences (CUSUM). Energy Management Information Systems (EMIS)	6	15%
5	Energy Management & Audit: Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, Bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering	6	15%
6	 Energy Efficiency in Thermal Utilities and systems: Boilers: Types, combustion in boilers, performances evaluation, analysis of losses, feed water treatment, blow down, energy conservation opportunities. Boiler efficiency calculation, evaporation ratio and efficiency for coal, oil and gas. Soot blowing and soot deposit reduction, reasons for boiler tube failures, start up, shut down and preservation, Thermic fluid heaters, super critical boilers. Steam System: Properties of steam, assessment of steam distribution losses, steam leakages, steam trapping, condensate and flash steam recovery system, identifying opportunities for energy savings. Steam utilization, Furnaces: Classification, general fuel economy measures in furnaces, excess air, heat distribution, temperature control, draft control, waste heat recovery. Insulation and Refractories: Insulation-types and application, economic thickness of insulation, heat savings and application criteria, Refractory-types, selection and application of refractories, heat loss. Cold insulation. Waste Heat Recovery: Classification, advantages and applications, commercially viable waste heat recovery devices, saving potential. Cogeneration: Definition, need, application, advantages, classification, saving potentials. Heat balance, steam turbine efficiency, tri-generation, micro turbine. Heating, Ventilation, Air-Conditioning (HVAC) and Refrigeration System: Factors affecting Refrigeration and Air conditioning system performance and savings Opportunities. Vapour Absorption Refrigeration System: Working principle, types and comparison with vapour compression system, ice bank system. and 	12	30%

	performance assessment of window and split room air conditioners, cold storage refrigeration, and humidification system.		
7	Energy and Environment, Air pollution, Climate change: United Nations Framework Convention on Climate Change (UNFCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), CDM Procedures case of CDM – Bachat Lamp Yojna and industry; Prototype Carbon Fund (PCF).	5	10%
	Total	45	100%

LESSON PLAN

Sr. No	Lecture No	Course Content	Hrs.			
1	1	Classification of energy	1			
2	2	Indian energy scenario	1			
3	3	3 Sectorial energy consumption (domestic, industrial and other sectors),				
4	4	Energy needs of growing economy	1			
5	5	Energy intensity, long term energy scenario, energy pricing,	1			
6	6	Energy security, energy conservation and its importance, energy strategy for the future.	1			
7	7	Energy conservation act 2001 and its features,	1			
8	8	Notifications under the act, schemes of bureau of energy efficiency (bee) including designated consumers,	1			
9	9	State designated agencies, electricity act 2003,	1			
10	10	Integrated energy policy, national action plan on climate change, ecbc code for building construction.	1			
11	11	Investment-need, appraisal and criteria, financial analysis techniques simple payback period,	1			
12	12	Return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis;	1			
13	13	Financing options, energy performance contracts and role of energy service companies (ESCOS)	1			
14	14	Defining monitoring & targeting, elements of monitoring & targeting,	1			
15	15	Data and information-analysis, techniques – energy consumption, production,	1			

16	16	Cumulative sum of differences (CUSUM). Energy management information systems (EMIS)	1
17	17	Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs,	1
18	18	Bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies,	1
19	19	Optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering	1
20	20	Types, combustion in boilers, performances evaluation,	1
21	21	Analysis of losses, feed water treatment, blow down,	1
22	22	Energy conservation opportunities. Boiler efficiency calculation,	1
23	23	Evaporation ratio and efficiency for coal, oil and gas. Soot blowing and soot deposit reduction,	1
24	24	Reasons for boiler tube failures, start up, shut down and preservation,	1
25	25	Thermic fluid heaters, super critical boilers.	1
26	26	Properties of steam, assessment of steam distribution losses,	1
27	27	Steam leakages, steam trapping, condensate and flash steam recovery system,	1
28	28	Identifying opportunities for energy savings. Steam utilization,	1
29	29	Classification, general fuel economy measures in furnaces, excess air,	1
30	30	Heat distribution, temperature control, draft control, waste heat recovery.	1
31	31	Insulation-types and application, economic thickness of insulation,	1
32	32	Heat savings and application criteria, refractory-types, selection and application of refractories, heat loss. Cold insulation.	1
33	33	Classification, advantages and applications,	1
34	34	Commercially viable waste heat recovery devices, saving potential.	1
35	35	Definition, need, application, advantages, classification, saving potentials.	1
36	36	Heat balance, steam turbine efficiency,	1

37	37	Tri-generation, micro turbine.	1
38	38	Factors affecting refrigeration and air conditioning system	1
39	39	Performance and savings opportunities.	1
40	40	Working principle, types and comparison with vapour compression system,	1
41	41	Ice bank system, and performance assessment of window and split room air conditioners, cold storage refrigeration, and humidification system.	1
42	42	United nations framework convention on climate change (UNFCC),	1
43	43	Sustainable development, kyoto protocol,	1
44	44	Conference of parties (COP), clean development mechanism (CDM),	1
45	45	CDM procedures case of CDM – bachat lamp yojna and industry; prototype carbon fund (PCF).	1
		Total hrs. Required to complete task	45

LIST OF PRACTICAL

Sr.	Title	Lab Hrs.
No.		
1	To study about energy scenario.	2
2	To study about energy conservation policies.	2
3	To study about financial management.	2
4	To study about energy monitoring and targeting.	4
5	To study about energy management & audit.	4
6	To study about energy efficiency in thermal utilities.	4
7	To study about energy and environment.	4
8	To study about air pollution.	4
9	To study climate change.	4
	Total	30

STUDENTS LEARNING OUTCOMES

• The student can identify different areas of Energy conservation and management.

• Can find the applications of all the areas in day to day life.

RECOMMENDED STUDY MATERIALS

TEXT & REFERENCE BOOKS

- 1. C.B.Smith, Energy Management Principles, Pergamon Press, New York, 1981.
- 2. W.C. Turner, Energy Management, Hand Book.
- **3.** Hamies, Energy Auditing and Conservation, Methods, Measurements, Management and Case Study, Hemisphere, Washington, 1980.
- **4.** Kreith, Economics of Solar Energy and Conservation Systems, Vol -3.
- 5. W.F.Kenny, Energy Conservation in Process Industry.
- **6.** Trivedi, P.R, Jolka K.R., Energy Management, Commonwealth Publication, New Delhi, 1997.
- 7. Witte, Larry C, Industrial Energy Management and Utilization, Hemisphere Publishers, Washinton, 1988.

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

3rd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE302-N	Subject Title: DISSERTATION PHASE-I
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	Teachin	g Schem	e		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
-	-	-	-	15	-	-	-	50	150	200

COURSE OBJECTIVE

- To present a problem oriented in depth knowledge of Dissertation Phase-I
- To address the underlying concepts and methods behind Dissertation Phase-I

INSTRUCTIONAL METHOD & PEDAGOGY

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Tutorial may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Reporting to respective guide is compulsory, which may carries 20 marks in CIA evaluation.
- Report based on project content will be given to the student for evaluation at regular interval. It may carry an importance of 100 marks in the overall internal evaluation.
- Seminar/PPT may be conducted and having share of 80 marks in the overall internal evaluation.
- Viva Voce will be conducted at the end of the semester of five 500 Marks.

STUDENTS LEARNING OUTCOMES

- The student can identify different areas of Dissertation Phase-I
- Can find the applications of all the areas in day to day life

ME MECHANICAL-AUTOMOBILE ENGINEERING DEPARTMENT ELECTIVE-V

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 3rd Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE303-N-A	Subject Title: Special Purpose Vehicle

	Teaching Scheme Evaluation Scheme									
L	т	Р	Total	Total Credit	The	eory	IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- To learn various concepts related to special purpose vehicles
- To have detailed understanding of special purpose vehicles principle to be applied in actual practice.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit No	Topics	Lectures (Hours)	Weigtage (%)
1	INTRODUCTION: Classification of Special Purpose Vehicles: based on applications, wheel types & truck type.	4	
2	Study of working principles & design considerations: of different		
	systems involved like power system, transmission, final drive,	7	20%
	lubrication, electrical, braking, steering, pneumatic & hydraulic control	,	
	circuits.		
3	Constructional & working features: of different types of earth moving		
	machinery such as Tippers, shovels, loaders, Excavators, Dumpers,	9	20%
	Dozers, Fork Lift truck, Road rollers.		20%
4	Study of instrumentation applied to special purpose vehicles/machines	2	
5	Farm Tractor: Layout, Load distribution, Engine, Transmission & Drive		
	line, Steering, Braking system, Wheels & Tyres, Hydraulic system,	15	20%
	Auxiliary Systems, Draw bar, PTO Shaft. Different types of Implements,	15	2070
	accessories and attachments. Tractor trolley.		
6	Mobile Cranes: Basic characteristics of truck cranes, stability & design	3	
	features, control systems & safety devices.	5	
7	Tracked Vehicles, Articulated Vehicles, Multi-axle Vehicles, fifth wheel		20%
	mechanism. Semi trailer & Prime mover brakes & electrical systems.	5	
	Dead Axles.		
8	Special Purpose Electric Vehicles, Solar Vehicles and Hybrid Vehicles.	7	
	Types, architecture and parameters of design considerations.	,	
9	Ergonomic application: Human factors in special purpose vehicle design		20%
	with reference to comfort, convenience and safety, effects of noise,	R	2070
	vibration and thermal stresses on human performance. Economics of	0	
	special purpose vehicle utilization.		
	Total	60	100%

LESSON PLANE

Sr.	Lecture	Course Content	Hrs.
No	No		
1	1	Introduction of special purpose vehicle	1
2	2	Classification of SPV and Application of SPV	1
3	3	Continue of Application of SPV	1
4	4	Continue of Application of SPV	1
5	5	Discuss working principles of different systems used in SPV	1
6	6	Power system	1
7	7	Continue to power system	1
8	8	Transmission system	1
9	9	Continue to transmission system	1
10	10	Final drive and lubrication system	1
11	11	Electrical system	1
12	12	Braking and steering system	1
13	13	Continue to steering system	1
14	14	Pneumatic & hydraulic control circuits	1
15	15	Constructional & working features: of different types of earth moving	1
		machinery	
16	16	Tippers	1
17	17	Shovels	1
18	18	Loaders	1
19	19	Excavators	1
20	20	Dumpers	1
21	21	Dozers	1
22	22	Fork Lift truck	1
23	23	Road rollers	1
24	24	Instrumentation applied to special purpose vehicles/machines	1

25	25	Continue to instrumentation	1
26	26	Define tractor. Give the classification of tractor. Also define wheel type and crawler type tractor and requirements for good tractor	1
27	27	Requirements for good tractor.	1
28	28	General features of tractor and selection of tractor	1
29	29	Wheel tractor and detail about components of wheel tractor.	1
30	30	Power transmission system in wheel tractor	1
31	31	Continue to power transmission in tractor	1
32	32	Hydraulic multipath clutch and tractor gear box	1
33	33	Conventional steering system of tractor	1
34	34	Hydraulic steering system of tractor	1
35	35	Braking system in tractor and terms used in tractor	1
36	36	Power tiller and novel features	1
37	37	Traction control unit and differential lock	1
38	38	Power take off shaft	1
39	39	Drawbar horse power and compare wheeled tractor with tracked tractor for their efficiency, drawbar horse power and slippage	1
40	40	Attachments of tractor	1
41	41	Ballasting of tractor	1
42	42	Basic characteristics of truck cranes	1
43	43	Stability & design features of mobile crane	1
44	44	Control systems & safety devices of mobile crane	1
45	45	Tracked vehicles vehicles	1
46	46	Articulated vehicles	1
47	47	Multi-axle Vehicles	1
48	48	Fifth wheel mechanism	1
49	49	Semi trailer systems	1
50	50	Electric vehicles	1

51	51	Possible EV configurations	1
52	52	Advantages and disadvantages of electric vehicle	1
53	53	Solar vehicle	1
54	54	Advantages and disadvantages and technical requirement of solar car	1
55	55	Series and parallel hybrid electric vehicle	1
56	56	Architectures of Hybrid Electric Drive Trains	1
57	57	Human factors in special purpose vehicle design with reference to comfort	1
58	58	Effects of noise, vibration and thermal stresses on human performance	1
59	59	Continue to effects of noise, vibration and thermal stresses on human performance	1
60	60	Economics of special purpose vehicle utilization	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL

Sr. No.	Title	Lab Hrs.
1	Experiment on different systems used in special purpose vehicles	6
2	Technical & operational features of a tractor	4
3	Technical & operational features of a power scraper	2
4	Technical & operational features of a power hoe and shovel.	4
5	Technical & operational features of a dumper	2
6	Technical & operational features of fork lift truck	2
7	Technical & operational features of a truck crane.	2
8	Experiment on electric vehicle and hybrid electric vehicle.	4
9	Experiment on solar vehicle	2
10	Experiment On Design Features Of Special Purpose Vehicles	2
	Total	30

STUDENTS LEARNING OUTCOME

On successful completion of the course

- Be able to understand fundamentals of subject
- Be able to interpret theoretical knowledge with practical application.
- Be able to produce new concept in engineering.

TEXT & REFERENCE BOOKS

- 1. "Construction Equipment Operation & Maintenance" by Y. Pokras and M. Tushnyakov, MIR,
- 2. Moscow.
- 3. "Truck Cranes", by A. Astskhov, MIR, Moscow.
- 4. "Motor Graders" by E.G. Poninson, MIR, Moscow.
- 5. "Material Handling Equipment" by N. Rudenko, MIR. Publishers.
- 6. "Electric Vehicles" by Sheldon, R.Shacket, Domus Books, New York.
- 7. Hand book of Earth Moving Machinery Central Water & Power Commission (Govt. of India).

WEB MATERIALS

• http://www.wikipedia.org

Kadi Sarva Vishwavidyalaya Faculty of Engineering and Technology 3rd Semester Master of Engineering (Mechanical-Automobile Engineering) In Effect from Academic Year 2017-18

Subject Code: MEAE303-N-B	Subject Title: Vibration Noise and Harshness Control
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Teaching Scheme						Eva	luation Sc	heme		
L	т	Р	Total	Total Credit	Th	eory	IE	CIA	Pract./ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

- Understanding the importance of Noise, Vibrations & Harshness related sources and mandatory requirements in Vehicular applications.
- Parameters affecting design criteria, construction & architecture, as well as operational systems for reduction of NVH.
- To help in understanding fundamental principles and automotive system applications, along with associated improvements implemented in different models of vehicles.

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Sr No	Content	Total Hrs	Weightage
			(%)
1	INTRODUCTION TO NHV:		
	Definition of Noise, Vibrations & Harshness in reference to Vehicular	5	10
	application. Study principles of Rolling, Pitch & Yaw velocity and		
	moments.		
2	FUNDAMENTALS OF NOISE AND VIBRATIONS:		
	Basic Concepts of Vibrations: Simple Harmonic Motion, Frequency of		
	Vibrations, Period, Natural Frequency, Resonant Frequency, Amplitude		
	of vibrations. Un-Damped & Damped Vibrations.		
	Types of Vibrations: Free & Forced Vibrations induced for Single degree		
	of freedom & Multi degrees of freedom.		
	Basic Concepts of Noise: Fundamentals of Acoustics. General Types of	10	20
	sound wave propagations- wave equation, specific acoustic impedance,		
	Plane wave & Spherical waves. Structure borne sound and air borne		
	sound. Interior noise sources and levels of noise.		
	Anatomy of human ear and mechanism of hearing. Sound intensity,		
	summation of pure tones (decibel addition), subtraction & averaging.		
	Octave and Octave bands.		
3	CHARACTERISTICS & SOURCES OF VIBRATIONS:		
	Power Train: Engine, Clutch, Transmission, Propeller shaft, Differential,		
	Drive shaft, Trans axle. Power train mounts.		
	Suspension: Different types of suspensions, Dampers, Rubber & Rubber	10	20
	embedded Metallic bushes. Passive and Active suspensions. Road		
	roughness & irregularities, Tyres & Wheels Low frequency vibrations:		
	due to body structure, Seat mounting, seat materials and Steering		
	assembly components.		
4	VIBRATIONS MEASUREMENT TECHNICS AND CONTROL:		
	Vibration measuring Instruments: Vibration pick-up, Types of		
	Transducers, Vibrometer etc. for measurement of Frequency of	10	10
	Methods of Control and vibrations isolation. Different Types of		
	Dampers. Vibrations absorber / isolator (including viscous damping.		
	sandwich construction).		
5	SOURCES OF NOISE, NOISE MEASUREMENT TECHNICS AND CONTROL:		
	Noise specifications and mandatory standards regulations. Brake Squeal		
	noise, Pass-by Noise, wind noise, squeak noise and rattle, interior noise	10	20
	(including noise emitted by running of accessories, indicators and all		
	accessories, cooling system and vehicle body protrusion noise. under		

	body protrusion noise. Noise due to Tyre-Road friction and slip characteristics. Noise Measuring Instruments: Microphone, Sound intensity probes. Noise Control: Damping treatment methods, Control through isolations and noise absorbing materials and structure. Active and semi-active control of noise. Study of anechoic chamber.		
6	Harshness: Definition. Its effect and acceptable degree of Harshness. Perception of Ride comfort i.e. psychological effects of Noise & Vibrations. Study of NVH - Legislations applicable for vehicles in India.	5	10
7	Safety: Passive safety Active safety. Study of Safety Regulations for vehicular application.	5	5
8	Introduction to software applications (Capabilities & Limitations of different software's) for analysis of NVH.	5	5
	TOTAL	60	100

LESSON PLANNING

Sr.	LECTURE NO	Course Content	Hrs.
No			
1	1	introduction to NHV	1
2	2	Definition of Noise	1
3	3	Vibrations & Harshness in reference to Vehicular application.	1
4	4	Study principles of Rolling,	1
5	5	Pitch & Yaw velocity and moments.	1
6	6	FUNDAMENTALS OF NOISE AND VIBRATIONS:	1
		Basic Concepts of Vibrations: Simple Harmonic Motion,	
		Frequency of Vibrations, Period, Natural Frequency,	
7	7	Resonant Frequency, Amplitude of vibrations. Un-Damped &	1
		Damped Vibrations.	
8	8	Types of Vibrations: Free & Forced Vibrations induced for	1
		Single degree of freedom & Multi degrees of freedom.	
9	9	Basic Concepts of Noise: Fundamentals of Acoustics.	1
10	10	Plane wave & Spherical waves	1
11	11	Structure borne sound and air borne sound	1
12	12	Interior noise sources and levels of noise	1
13	13	Anatomy of human ear and mechanism of hearing.	1
14	14	Sound intensity, summation of pure tones (decibel addition)	1
15	15	subtraction & averaging. Octave and Octave bands.	1
16	16	Introduction of Characteristics & Sources Of Vibrations	1

17	17	Characteristics & Sources Of Vibrations:	1
		Power Train: Engine, Clutch, Transmission, Propeller shaft,	
		Differential, Drive shaft, Trans axle. Power train mounts.	
18	18	Suspension: Different types of suspensions,	1
19	19	Dampers, Rubber & Rubber embedded Metallic bushes.	1
20	20	Passive and Active suspensions.	1
21	21	Road roughness & irregularities	1
22	22	Tyres & Wheels Low frequency vibrations: due to body structure	1
23	23	Tyres & Wheels Low frequency vibrations: due to body structure	1
24	24	Seat mounting and seat materials	1
25	25	Steering assembly components.	1
26	26	Introduction of Vibrations Measurement Technics And Control	1
27	27	Vibration measuring Instruments	1
28	28	Vibration pick-up	1
29	29	Types of Transducers	1
30	30	Vibrometer	1
31	31	measurement of Frequency of vibrations,	1
32	32	Period, Amplitude, Velocity and acceleration parameters.	1
33	33	Methods of Control and vibrations isolation: Different Types of Dampers	1
34	34	Vibrations absorber / isolator (including viscous damping, sandwich construction)	1
35	35	Vibrations absorber / isolator (including viscous damping, sandwich construction)	1
36	36	Introduction of Sources Of Noise, Noise Measurement Techniques And Control: Noise specifications and mandatory standards regulation	1
37	37	Brake Squeal noise, Pass-by Noise, wind noise, squeak noise and rattle	1
38	38	interior noise (including noise emitted by running of accessories, indicators and all buzzers)	1
39	39	Power train, Engine Air Intake & Exhaust noise, Engine accessories,	1
40	40	Cooling system and vehicle body protrusion noise, under body protrusion noise.	1
41	41	Noise due to Tyre-Road friction and slip characteristics	1

42	42	Noise Measuring Instruments: Microphone, Sound intensity probes	1
43	43	Noise Control: Damping treatment methods	1
44	44	Control through isolations and noise absorbing materials and structure	1
45	45	Active and semi-active control of noise and study of anechoic chamber	1
46	46	Harshness: Definition & Introduction	1
47	47	Harshness: Its effect and acceptable degree of Harshness	1
48	48	Harshness: Its effect and acceptable degree of Harshness	1
49	49	Perception of Ride comfort i.e. psychological effects of Noise & Vibrations.	1
50	50	Study of NVH - Legislations applicable for vehicles in India	1
51	51	Concept of Safety:	1
52	52	Concept of Passive safety	1
53	53	Concept of Active safety.	1
54	54	Concept of Active safety & its importance	1
55	55	Study of Safety Regulations for vehicular application.	1
56	56	Introduction to software applications	1
57	57	Brief study of software applications	1
58	58	Brief study of software applications	1
59	59	Software applications (Capabilities & Limitations of different software's) for analysis of NVH.	1
60	60	Software applications (Capabilities & Limitations of different software's) for analysis of NVH.	1
		TOTAL Hrs. Required To complete Task	60

LIST OF PRACTICAL :

- Write Definition of Noise, Vibrations & Harshness in reference to Vehicular application. Discuss / Study principles of Rolling, Pitch & Yaw velocity and moments. Write the phenomena of Rolling, Pitch & Yaw velocity.
- Discuss and write: Basic Concepts of Vibrations e.g. Simple Harmonic Motion, Frequency of Vibrations, Period, Natural Frequency, Resonant Frequency, and Amplitude of vibrations. Un-Damped & Damped Vibrations.
- 3. Write Types of Vibrations: Free & Forced Vibrations induced for Single degree of freedom & Multi degrees of freedom. Vibration measuring techniques and methods of Control.

- 4. Study different sources of Vibrations: Power Train components & assemblies. Road roughness & irregularities, Tyres & Wheels, Low frequency vibrations: due to body structure, Seat mounting, seat materials and Steering assembly components.
- 5. Study Different types of suspensions, Dampers, Rubber & Rubber embedded Metallic bushes and also the Passive and Active suspensions.
- Understand Fundamentals of Acoustics, General Types of sound wave propagationswave equation, specific acoustic impedance, Plane wave & Spherical waves.
 Differentiate between Structure borne sound and air borne sound, and Interior noise sources and levels of noise. Noise level measurement techniques and control methods.
- 7. Study of Anatomy of human ear and mechanism of hearing. Learn Sound intensity, summation of pure tones (decibel addition), subtraction & averaging. Understand Octave and Octave bands.
- 8. Understand effect of Vibration & Noise, define Harness. Perception of riding comfort.
- 9. Legislations on Vibrations & Noise levels.
- 10. Legislations for Safety standards and test methods.
- 11. Study of applications of MAT LAB / LAB VIEW / SIMULINK /CFD / Hyper works.

STUDENTS LEARNING OUTCOME

After successful completion of the course, the student will be able to

- Students will become familiar with the basic terminologies of Noise, Vibration & Harshness NVH, which is a major focus for high end luxury vehicles manufacturers, in the current times.
- Students will acquire Comprehensive, theory based understanding of natural and physical sciences along with engineering fundamentals related to Sources of Vibration and Noise applicable to the automobile engineering discipline and possibility of modifications and improvements.
- Student will understand Application of engineering techniques, tools, for measurement methods in order to learn to control and solve complex Vehicle vibrations behavior /as well as performance problems.
- Student will learn Application of systematic engineering synthesis and design processes for eliminating or reducing the Vibration, Noise to reduce irritation to occupants and achieve improvement in perception of ride comfort.

TEXT BOOKS & REFERENCE BOOKS

- 1. Vehicle Noise, Vibration, and Sound Quality by Gang Sheng Chen, SAE International Publications.
- 2. Fundamentals of Noise and Vibration, by Norton M.P, Cambrige University Press
- 3. Mechanical Vibrations & Noise Control, by Dr. Sadhu Singh, Khanna Publishers.
- 4. Mechanical Vibrations by G.K.Grover, Published by Nem Chand & Bros, Roorkee, India.

- 5. Mechanical Vibrations, by S.S.Rao, Pearson.
- 6. Theory of Vibration with Applications, by W.T.Thomson & M.D.Dahleh, Pearson Education.
- 7. Dynamic Vibration Absorbers, by Borris and Kornev, John Wiley Publications.
- 8. Noise Control of Internal Combustion Engine, by Baxa, John Wiley Publications.
- 9. Acoustic Duct and Mufflers by Munjal N.S, John Wiley Publications.
- 10. Mechanical Vibrations, by Dr. V.P.Singh, Published by Dhanpat Rai & Co (P) Ltd.
- 11. Vibrations and Noise for Engineers, by Kewal Pujara, Dhanpat Rai & Co (P) Ltd.
- 12. Text Book of Mechanical Vibrations, by Rao V. Dukkipati and J. Srinivas, Prentice-Hall of India Pvt. Ltd
- 13. Brake NVH Testing and Measurements by J.K.Thompson, SAE International Publications.

WEB MATERIALS

- http://www.wikipedia.org
- http://nptel.ac.in
- http://ocw.mit.edu
- http://www.cfd-online.com
- https://www.araiindia.com
- https://www.sae.org

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

3rd Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE303-N-C	Subject Title: FINITE ELEMENT METHODS IN AUTOMOBILE
	ENGINEERING

	Teachin	g Schem	е		Evaluation Scheme					
L	т	Р	Total	Total Credit	The	eory	IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES

The educational objectives of this course are

- To present a problem oriented in depth knowledge of Finite Element Methods in Automobile Engineering
- To address the underlying concepts and methods behind Finite Element Methods in Automobile Engineering

INSTRUCTIONAL METHOD AND PEDAGOGY

(Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries 05 marks in overall evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of 10 marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar may be conducted and having share of 05 marks in the overall internal evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

DETAILED SYLLABUS

Unit No	Topics	Lecture (Hours)	Weigtage (%)
1.	INTRODUCTION TO FEM: Engineering design analysis-meaning and purpose, steady state, propagation and transient problems. Basic concepts of FEM. Applicability of FEM to structural analysis, heat transfer and fluid flow problems. Advantages and limitations of FEM. Test for convergence. Element choice. Commercial finite element packages organization-advantages and limitations.	10	10%
2.	STATIC ANALYSIS OF ONE DIMENSIONL ELEMENT: General procedure of FEM. Skeletal and continuum structures. Discretization of domain, basic types of elements. Concept of stiffness analysis, direct approach, Rayleigh-Ritz method, formal approach using shape function. Formulation of element stiffness matrices by potential energy approach, 1D spar and beam elements. Galerkin's residual method and its application to a one, dimensional bar.	10	15%
3.	STATIC ANALYSIS OF 2D AND 3D ELEMENTS: 2D triangular and quadrilateral elements, axis symmetric elements, 3D tetrahedron element, Isoperimetric formulation. Treatment of boundary condition. Mesh generation techniques.	10	15%
4.	DYNAMIC ANALYSIS: Equations of motion for dynamic problems. Consistent and lumped mass matrices. Formulation of element mass matrices. Free vibration problem formulation. Time, dependent one-dimensional bar analysis.	10	15%
5.	HEAT TRANSFER AND FLUID FLOW ANALYSIS: Basic equations of heat transfer and fluid flow problems. Finite element formulation using variational method. One dimensional heat transfer and fluid flow problems, Transient thermal analysis. Application of Galerkin's method to heat transfer problems.	10	15%
6.	BOUNDARY ELEMENT METHOD: Principle of boundary element method. Conversion of basic weighted residue statement into boundary integral equation. Concept of fundamental solution. Application to heat transfer problems. Brief introduction to formulation of problems in elastostatics.	10	30%
	I OTAI	60	100%

LESSON PLANNING

Sr.	Lecture	Course Content	Hrs.
No	No		
1	1	Introduction	1
2	2	Basic concepts	1
3	3	Engineering design analysis-meaning and purpose,	1
4	4	Steady state.	1
5	5	Steady state.	1
6	6	Propagation and transient problems	1
7	7	Propagation and transient problems	1
8	8	Basic concepts of FEM, .	1
9	9	Applicability of FEM to structural analysis,	1
10	10	Applicability of FEM to structural analysis,	1
11	11	Heat transfer and fluid flow problems	1
12	12	Advantages and limitations of FEM.	1
13	13	Test for convergence.	1
14	14	Element choice.	1
15	15	Commercial finite element packagesorganization- advantages and limitations.	1
16	16	Commercial finite element packagesorganization- advantages and limitations.	1
17	17	General procedure of FEM. Skeletal and continuum structures.	1
18	18	Discretization of domain	1
19	19	Discretization of domain	1
20	20	Basic types of elements	1
21	21	Concept of stiffness analysis,	1
22	22	Concept of stiffness analysis,	1
23	23	Direct approach, Rayleigh-Ritz method	1
24	24	Direct approach, Rayleigh-Ritz method	1
25	25	Formal approach using shape function	1
26	26	Formulation of element stiffness matrices by potential energy approach,	1
27	27	Formulation of element stiffness matrices by potential energy approach	1

28	28	1D spar and beam elements.	1
29	29	1D spar and beam elements.	1
30	30	Galerkin's residual method and its application to a one, dimensional bar	1
31	31	Galerkin's residual method and its application to a one, dimensional bar	1
32	32	2D triangular and quadrilateral elements	1
33	33	2D triangular and quadrilateral elements	1
34	34	axisymmetric elements,	1
35	35	Axisymmetric elements,	1
36	36	3D tetrahedron element	1
37	37	3D tetrahedron element	1
38	38	Isoparametric formulation.	1
39	39	Treatment of boundary condition.	1
40	40	Mesh generation techniques	1
41	41	Mesh generation techniques	1
42	42	Mesh generation techniques	1
43	43	Equations of motion for dynamic problems. Consistent and lumped mass matrices.	1
44	44	Equations of motion for dynamic problems. Consistent and lumped mass matrices.	1
45	45	Formulation of element mass matrices	1
46	46	Free vibration problem formulation.	1
47	47	Free vibration problem formulation.	1
48	48	Dependent one-dimensional bar analysis.	1
49	49	Basic equations of heat transfer and fluid flow problems.	1
50	50	Basic equations of heat transfer and fluid flow problems.	1
51	51	Finite element formulation using variational method	1
52	52	Finite element formulation using variational method	1
53	53	Transient thermal analysis.	1
54	54	Application of Galerkin's method to heat transfer problems	1
55	55	Principle of boundary element method.	1

56	56	Conversion of basic weighted residue statement into boundary integral equation	1
57	57	Concept of fundamental solution.	1
58	58	Application to heat transfer problems.	1
59	59	Brief introduction to formulation of problems in elastostatics.	1
60	60	Introduction	1
		TOTAL Hrs. Required To complete Task	60

LIST OF EXPERIMENTS

SR NO	LIST OF EXPERIMENTS					
1	Introduction to Finite Element Analysis software.					
2	Solve Plane truss problems, using FEA software and manually. Include problems with symmetry.					
3	Solve Beam problems with different boundary and loading conditions using FEA software and manually.	6				
4	Solve planar problems.					
5	Solve axisymmetric problems.	4				
6	Solve Dynamic problems	4				

STUDENT LEARNING OUTCOME

- The student can identify different areas of Finite element modeling and analysis.
- Can find the applications of all the areas in day to day life.

RECOMMANDED STUDY MATERIAL

TEXT & REFERENCE BOOKS

- 1. Cook R.D. "Concepts and applications of finite element analysis" Wiley, New York, 1981.
- 2. Bathe K.J., Cliffs, N.J. "Finite element procedures in Engineering Analysis", Englewood.Prentice Hall, 1981.
- 3. Reddy J. N., Finite Element Method, Tata McGrawHill Edition, 2E, 2003.
- 4. Chandrupatla and Belegundu "Introduction to finite elements in Engineering", Prentice Hall of India Pvt. Ltd. New Delhi, 2001.
- 5. Segerling L.J. 'Applied finite elements analysis' John Wiley and Sons.
- 6. Bathe- 'Finite Element Methods' Prentice Hall of India (P) Ltd, New delhi.
- 7. O.C. Zienkiewicz 'Finite Element Method' Tata Mc Graw Hill, New Delhi.
- 8. J.N. Reddy- 'An Introduction to FEM', Mc Graw Hill International Edition
- 9. C.S. Krishnamoonthy-'Finite Element Analysis Theory and Programming', Tata McGraw Hill Publishing Co. Ltd, New Delhi.
- 10. Nitin Gokhale, Deshpande-'Practical Finite Element Analysis, Finite to Infinite

ME MECHANICAL-AUTOMOBILE ENGINEERING SEMESTER-4

Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

4th Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE401-N	Subject Title: MID SEMESTER THESIS PROGRESS REVIEW
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Teaching Scheme					Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
-	-	-	-	05	-	-	-	50	150	200

COURSE OBJECTIVE

- To present a problem oriented in depth knowledge of Mid semester Thesis Progress Review
- To address the underlying concepts and methods behind Mid semester Thesis Progress Review

INSTRUCTIONAL METHOD & PEDAGOGY

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Tutorial may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Reporting to respective guide is compulsory, which may carries 10 marks in CIA evaluation.
- Report based on project content will be given to the student for evaluation at regular interval. It may carry an importance of 70 marks in the overall internal evaluation.
- Seminar/PPT may be conducted and having share of 20 marks in the overall internal evaluation.
- Viva Voce will be conducted at the end of the semester of 200 Marks.

STUDENTS LEARNING OUTCOMES

- The student can identify different areas of Mid semester Thesis Progress Review
- Can find the applications of all the areas in day to day life.
Kadi Sarva Vishwavidyalaya

Faculty of Engineering and Technology

4th Semester Master of Engineering (Mechanical-Automobile Engineering)

In Effect from Academic Year 2017-18

Subject Code: MEAE402-N	Subject Title: DISSERTATION PHASE-II
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Teaching Scheme				Evaluation Scheme						
L	т	Р	Total	Total Credit	Theory		IE	CIA	Pract/ Vivo	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
-	-	-	-	20	-	-	-	100	200	300

COURSE OBJECTIVE

- To present a problem oriented in depth knowledge of Dissertation Phase-II
- To address the underlying concepts and methods behind Dissertation Phase-II

INSTRUCTIONAL METHOD & PEDAGOGY

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Tutorial may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Reporting to respective guide is compulsory, which may carries 20 marks in CIA evaluation.
- Report based on project content will be given to the student for evaluation at regular interval. It may carry an importance of 100 marks in the overall internal evaluation.
- Seminar/PPT may be conducted and having share of 80 marks in the overall internal evaluation.
- Viva Voce will be conducted at the end of the semester of 500 Marks.

STUDENTS LEARNING OUTCOMES

- The student can identify different areas of Dissertation Phase-II
- Can find the applications of all the areas in day to day life.