SHRI VENKATESHWARA UNIVERSITY



Syllabus

Diploma

Mechanical Engineering(Automobile)

V semester

(THREE Years Programme)

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

	Mechanical Engineering(Automobile)SEMESTER-V												
Sl		Subject	Р	eriod	s	E	valuatio	n Scheme	;	End Ser	End Semester		
N	Subject Codes		L	Т	Р	C T	T A	Tot al	P S	TE	P E	Tot al	Credit
1	PAE - 501	Automobile Component Design	3	0	0	20	10	30		70		100	3
2	PAE -502	Automotive Chassis-II	3	0	0	20	10	30		70		100	3
3	PAE -503	Hydraulics & Pneumatics	3	0	0	20	10	30		70		100	3
4	PAE - 504	Earth Moving Equipments & Farm Machinery	3	0	0	20	10	30		70		100	3
5	PAE-505	Mechatronics	3	1	0	20	10	30		70		100	3
6	PAE-511	Automobile Component Design Lab	0	0	2				10		15	25	1
7	PAE-512	Automotive Chassis-II Lab	0	0	2				10		15	25	1
8	PAE-513	Strength of Material And Hydraulic & Pneumatic	0	0	2				10		15	25	1
9	PAE-514	Summer Internship- II	0	0	6				50			50	3
10	PAE-515	Project Phase -I		0	4				50		50	100	2
												725	23
Sum	mer Internship	-II (6 weeks) after IVth	n Sem	·					<u> </u>				

Course C Duratio Te Theor Tutori Practic	Code: on: aching So ry: al:	AE 17 Weeks cheme : 02hrs / week Nil	Semester :FifthMaximum Marks :100 MarksExamination Scheme :TheoryInternal Examination :	S
Duratio Teo Theor Tutori Practic	on: aching So y: al:	17 Weeks cheme : 02hrs / week Nil	Maximum Marks : 100 Mark Examination Scheme : Theory Internal Examination :	s
Teo Theor Tutori Practic	aching So ry: al:	cheme : 02hrs / week Nil	Examination Scheme : Theory Internal Examination :	
Theor Tutori Practic	ry: al:	02hrs / week Nil	Internal Examination :	
Tutori Practic	al:	Nil		30 Marks
Practic			TA [Attendance, Assignment, Interact	tion etc.]:
Practic				10
Practic				Marks
	cal:	02hrs / week	End Semester Exam :	70 Marks
	Credit :	3		
			Aims :	
• <i>To</i>) impart kn	owledge of fundan	nental concept of machine design applied to autor components.	nobile
•	To impar	t exposure to stan	dard codes of practices, CAD & Use of Design D	ata Book.
	٠	To impart knowle	edge concerned to Automobile Component Design.	
			Objectives:	
			Students will be able to:	
1.	Analyze th	e loads, type of in	duced stresses, resisting areas & hence the modes	s of failure.
	2.	Identify modes of	of failure & relevant theory for problem solving.	
3. A	nalyze pra	ctical problems &	make use of materials, strength equations, factor	of safety etc.
4. Us	e design da	ita book to standa	urdize component dimensions, and to select dimens	sional
			tolerances.	
			Pre-requisite :-	
Knowlea	lge of Meci	hanisms, Strength	of materials, Material sciences- Manufacturing pa	rocesses &
		Mech	nanical engineering drawing.	
Evenine	tion Cabor	The exetine	Tota	A Aarles 150
Examina	tion scher	ne: Theoretical	Content · Theory	I IVIUI KS : 50
			Name of the Topics	Hours
Chanter		n	sic concepts of Design :	10
<i>Chapter</i> <i>01</i>		Ba	1 1 0	
Chapter 01	1.1 Introd	Ba. duction to design, (Classification of design, Design consideration	
Chapter 01	1.1 Introd	Ba. duction to design, (Classification of design, Design consideration &Design procedure.	
Chapter 01	1.1 Introd	Ba . duction to design, (Classification of design, Design consideration &Design procedure. 1.2 Stress analysis:	
<i>Chapter</i> <i>01</i>	1.1 Introd	Ba. duction to design, (1.2	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads.	
Chapter 01	1.1 Introd 1.2.2 Type	Ba. duction to design, (1.2 s of induced stresse	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and	
Chapter 01	1.1 Introd 1.2.2 Type bea	Ba. duction to design, 1.2 s of induced stresse ring pressure, ben	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and ding, torsion, thermal stresses, creep, proof	
Chapter 01	1.1 Introd 1.2.2 Type bea	Ba. duction to design, 1.2 s of induced stresse ring pressure, ben stresses,	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and ding, torsion, thermal stresses, creep, proof resilience, principal stresses.	
Chapter 01	1.1 Introd 1.2.2 Type bea 1.2.3 V	Ba. duction to design, (1.2 s of induced stresses tring pressure, bent stresses, ariable stresses in	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and ding, torsion, thermal stresses, creep, proof resilience, principal stresses. machine parts, fatigue & endurance limit, be diagrams for variable stresses.	
Chapter 01	1.1 Introd 1.2.2 Type bea 1.2.3 V	Ba. duction to design, (1.2 s of induced stresse tring pressure, ben stresses, ariable stresses in stress–Tim 2.4 Working stress	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and ding, torsion, thermal stresses, creep, proof resilience, principal stresses. machine parts, fatigue & endurance limit, the diagrams for variable stresses.	
Chapter 01	1.1 Introd 1.2.2 Type: bea 1.2.3 V 1	Ba. duction to design, (1.2 s of induced stresse vring pressure, bena stresses, ariable stresses in stress–Tim .2.4 Working stress 1.25 Factor	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and ding, torsion, thermal stresses, creep, proof resilience, principal stresses. machine parts, fatigue & endurance limit, the diagrams for variable stresses. ses for static load, variable or fatigue load. of safety selection of factor of safety	
Chapter 01	1.1 Introd 1.2.2 Type. bea 1.2.3 V 1	Ba. duction to design, (1.2 s of induced stresse tring pressure, ben stresses, ariable stresses in stress–Tim .2.4 Working stress 1.2.5 Factor of 1.2 6 Stress	Classification of design, Design consideration &Design procedure. 1.2 Stress analysis: .1 Types of external loads. es: tensile, compressive, shear, Crushing and ding, torsion, thermal stresses, creep, proof resilience, principal stresses. machine parts, fatigue & endurance limit, the diagrams for variable stresses. ses for static load, variable or fatigue load. of safety, selection of factor of safety. concentration causes and remedies	
Examina	tion Scher	ne: Theoretical	Tota Content : Theory Name of the Topics sic concepts of Design :	I Marks : 50 Hours 10

Automobile Component Design (PAE 501)

	M	aximum shear st	tress theory, Distortio	on energy theory.				
	1.3 Designation	n of materials a	s per IS and introduc	ction to International				
	standards &	advantages of si	tandardization, use o	f design data book, use				
	ofs	tandards in des	ign and preferred nu	mbers series.				
	1.4 Selection of m	aterial and just	ifications for Automo	bile components.				
	Adv	anced Materials	for automotive comp	ponents.				
	1.5 Bearings-Clas	sification, locat	ion in Automobiles s	ystems & selection				
		0	f bearings.					
	1.6 Post de	sign aspects - E	rgonomic aspect, Ae	sthetic				
	consideration	on(Shape, color,	surface finish) for A	utomobile.				
02	210	Design o	f shaft, keys & level	rs:				
	2.1 Conceptual understanding of shaft, axles & spindles.							
	2.2 Design of shaft for torsion, rigidity, bending, combined torsion &							
	225	De De	enaing.	:-4:				
	2.3 L	esign oj propeli אר	er shaji, whirling &	critical speea.	08			
	2.5 Tunes of kan	2.4 L design of Sunk	Pootanoulan Vov. Fi	fact of konnums on				
	2.5 Types of keys	, uesign of sunk	Reclangular Key, Ej	ject of keyways on				
			Types of layers					
	2.7 Design of foll	2.0 wing lovers for	ractangular cross sa	ection & fulcrum nin				
	2.7 Design of jollowing levers for reciangular cross-section & julcrum pin only:-a) Rocker arm & b) Rell crank lever							
0.3		Design of Cha	ssis & engine com	onents.				
	3 1 Design of clutch- Single plate & Multi plate							
	3.2 Data of engine specifications and calculations of cylinder dimensions for							
		~ <i>P</i> •• <i>J</i> •• <i>I</i>	given power.	,				
	3	3 Design of cvl	inder head thickness	and bolts.	14			
	3.4 Design of p	iston crown by l	bending strength and	thermal considerations.				
	0 = 0	3.5 Design of 1	piston rings and skirt	length.				
	3.6 Design of	of piston pin for	bearing, bending &	shear considerations.				
	3.7 L	Design of connec	cting rod cross -section	on (I section).				
		3.8 Design	of big end, cap and b	polts.				
		Тс	otal		32 hrs.			
Total Cla	isses			17 weeks [34	lecture hrs.]			
Examinat	tion Scheme: (The	oretical)		101	al Marks = 35			
Group	Chapter		Object	ive Questions	Total Marks			
		To be Set	To be Answered	Marks per Question				
A	01	05	Any ten	01	$10 \times 01 = 10$			
B	02	03						
C	03	07						
Group	Chanter		Objective O		Total Marks			
Group	Chupter	T I C /	Objective Ques	stions				
	01	To be Set	To be Answered	Marks per Question	05 5 25			
			Any five	05	$05 \times 5 = 25$			
В	02	02	-					
C	03	04						
			Practical					
		C1,:1	I rucucui.					
	Skuis to be developed:							

1) Analyze the loads, resisting arreas, types of induced stresses on automobile components. 2) Analyze the modes of failure of different automobile components & identify the methods, strength equations to overcome the failures. 3) Calculate the dimensions of automobile components. 4) Identify different engine & chassis components. 4) Identify different engine & chassis components. 3) Use design data book to standardize components. 5) Use CAD software to draw automobile components. 6) Ontinuous Internal Sessional Assessment: 25 marks. 1) Attending classes, doing practicals & submitting respective note book in time = 20 marks. 11) Viva-Voce = 05 marks 110) Viva-Voce = 05 marks. 111) Viva-Voce = 05 marks. 112) Viva-Voce = 05 marks. 111) Viva-Voce = 05 marks. 112) Viva-Voce = 05 marks. 113) Viva-Voce = 05 marks. 114 dentify the different engine & chasis components which may fail due to stress 02 124 dentify the different engine & chasis components which may fail d		Intellactual Chilles	
 Analyze ine ioads, resisting areas, types 6/ induced stresses on automobile components. Analyze the modes of failure of liferent automobile components & identify the methods, strength equations to overcome the failures. Calculate the dimensions of automobile components. Identify different engine & chassis components. Draw various automobile components as per the designed dimensions. Use edvanced materials for automobile components. Use davanced materials for automobile components. Use CAD software to draw automobile components. Use CAD software to draw automobile components. Itending classes, doing practicals & submitting respective note book in time = 20 marks. Nater of Design Practical for Continuous Internal Sessional Assessment:25 marks. Attending classes, doing practicals & submitting respective note book in time = 20 marks. Notal (1 + 11) = 25 Marks. External Sessional Assessment:25 marks. External Sessional Assessment:25 marks. External Sessional Assessment:25 marks. Use of advanced materials (preduce stress concentration. Use of advanced materials (preduce stress concentration. Use of advanced materials (preduce stress concentration. Design any one machine elements (socket & spigot type cotter joint / Knuckle 08 joint) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. Design any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare		Interfectual Skills: 1) Another the loads mainting arous times of induced structure or suit.	a outo
2) Analyze the models of jalance of alignerin automobile components. 3) Calculate the dimensions of automobile components. 3) Calculate the dimensions of automobile components. 4) Identify different engine & chassis components. 4) Identify different engine & chassis components. 3) Use design data book to standardize components. 3) Use design data book to standardize component dimensions. 2) Use davanced materials for automobile components. 3) Use design data book to standardize components. 3) Use design data book to standardize components. 5) Use CAD software to draw automobile components. 5) Use CAD software to draw automobile components. <i>Examination Scheme : Practical</i> Total Marks : 50 • Continuous Internal Sessional Assessment:25 marks. 1) Niva-Voce = 05 marks II) Viva-Voce = 05 marks III) Total (1 + II) = 25 Marks. III) Total (1 + II) = 25 Marks. External Teacher [Lect.] 51. No. List of Design Practical [for Continuous Internal Assessment] Hours 01 Identify the different engine & chasis components which may fail due to stress 02 02 Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 03 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle joint) for specified data, select suitable	2)	1) Analyze the loads, resisting areas, types of induced stresses on automobile compo-	nents.
Single equations to Vertranses. Single equations to Vertranses. Single equations to Vertranses. Single equations to Vertranses of automobile components. Single equations of automobile components. Single equations to Vertranses of automobile component. Single equations to Vertranses of automobile components. Single equations to Vertranses of automobile components and the second of t	2) A	individe the modes of juliare of different automobile components & taenify the method strength equations to overcome the failures	З,
4) Identify different engine & chassis components. 4) Identify different engine & chassis components. 1) Draw various automobile components as per the designed dimensions. 2) Use advanced materials for automobile components. 3) Use design data book to standardize component dimensions. 4) Prepare bill of materials. 5) Use CAD software to draw automobile components. Examination Scheme : Practical Total Marks : 50 • Continuous Internal Sessional Assessment:25 marks. 1) Attending classes, doing practicals & submitting respective note book in time = 20 marks. 11) Total (1 + 11) = 25 Marks. • External Sessional Assessment:25 marks. Examiner : External Teacher [Lect.] SI.No. List of Design Practical [for Continuous Internal Assessment] 01 Identify the different engine & chassis components which may fail due to stress 02 Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle join) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 04 Design any one coupling (Muff coupling / bush pin type flexible coupling) for		3) Calculate the dimensions of automobile components	
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Motor Skills: 1) Draw various automobile components as per the designed dimensions. 2) Use advanced materials for automobile components. 3) Use design data book to standardize component dimensions. 4) Prepare bill of materials. 5) Use CAD software to draw automobile components. Examination Scheme : Practical Total Marks : 50 Continuous Internal Sessional Assessment: 25 marks. I) Attending classes, doing practicals & submitting respective note book in time = 20 marks. III) Total (1 + 11) = 25 Marks. External Sessional Assessment: 25 marks. ISINO. List of Design Practical [for Continuous Internal Assessment] Hours OI Identify the different engine & chasis components which may fail due to stress OI Use of advanced materials with justifications for components like gears, piston, 02 Use of advanced materials with justifications of components like gears, piston, 02 08 specified data, select suitable materials, pr		4) Taentijy utijerent engine & chassis components.	
(1) Draw various automobile components as per the designed dimensions. 2) Use advanced materials for automobile components. 3) Use design data book to standardize component dimensions. 4) Prepare bill of materials. 5) Use CAD software to draw automobile components. Examination Scheme : Practical Total Marks : 50 • Continuous Internal Sessional Assessment: 25 marks. (1) Attending classes, doing practicals & submitting respective note book in time = 20 marks. (1) Viva-Voce = 05 marks (1) Viva-Voce = 05 marks (1) Attending classes, doing practical for Continuous Internal Assessment: - 25 marks. External Sessional Assessment: - 25 marks. External Sessional Assessment: - 25 marks. External Sessional Assessment: - 25 marks. 01 Identify the different engine & chassis components which may fail due to stress ocncentration. 02 Use of advanced materials with justifications for components like gears, piston. 02 Use of advanced materials speraper assembly-detail. drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also 04 Design any one machine elements. prepare assembly-detail. 05 Design of Prower trail for a given engine power]: (Piston, Piston rings, spiston pin, connecting rod, crankskaft)		Motor Skills:	
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3) Use design data book to standardize component dimensions. 4) Prepare bill of materials. 5) Use CAD software to draw automobile components. Examination Scheme : Practical Total Marks : 50 • Continuous Internal Sessional Assessment: - 25 marks. I) Attending classes, doing practicals & submitting respective note book in time = 20 marks. II) Viva-Voce = 05 marks III) Total (1 + 1) = 25 Marks. • External Sessional Assessment: - 25 marks. Examiner : External Teacher [Lect.] SI. No. List of Design Practical [for Continuous Internal Assessment] 01 Identify the different engine & chassis components which may fail due to stress 02 Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle joint) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 04 Design any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 05 DESIGN PROJECT: (any one) 12 1 </td <td></td> <td>2) Use advanced materials for automobile components.</td> <td></td>		2) Use advanced materials for automobile components.	
4) Prepare bill of materials. 5) Use CAD software to draw automobile components. Examination Scheme : Practical Total Marks : 50 • Continuous Internal Sessional Assessment:25 marks. 1) Attending classes, doing practicals & submitting respective note book in time = 20 marks. II) Vira-Voce = 05 marks III) Total (1+11) = 25 Marks. • External Sessional Assessment:25 marks. Examiner : External Assessment 01 Identify the different engine & chassis components which may fail due to stress 01 Identify the different engine & chassis components which may fail due to stress 02 Use of advanced materials with justifications for components like gears, piston. 02 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle 08 03 04 Design any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare assembly-detail, drawing one CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 08 05 Design of Prower train [for a given engine power]: (Piston, Piston rings, piston pin, connecting rod, crankshaft) 12 05 Design of Transmission train [for a given engine power]: (clutc		3) Use design data book to standardize component dimensions.	
5) Use CAD software to draw dutomobile components. Examination Scheme : Practical Total Marks : 50 • Continuous Internal Sessional Assessment:25 marks. 1) Attending classes, doing practicals & submitting respective note book in time = 20 marks. II) Viva-Voce = 05 marks III) Total (1 + II) = 25 Marks. • External Sessional Assessment:25 marks. III) Total (1 + II) = 25 Marks. • External Sessional Assessment:25 marks. Examiner : External Teacher [Lect.] SI. No. List of Design Practical [for Continuous Internal Assessment] Hours 01 Identify the different engine & chassis components which may fail due to stress concentration, observe & state remedy to reduce stress concentration. 02 02 Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 03 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle joint) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 08 04 Design any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 12 05 DESIGN PROJECT: (any one) 12 <td></td> <td>4) Prepare bill of materials.</td> <td></td>		4) Prepare bill of materials.	
Total Marks : 50 Continuous Internal Sessional Assessment:25 marks. 1) Attending classes, doing practicals & submitting respective note book in time = 20 marks. III) Total (1 + II) = 25 Marks. III) Total (1 + II) = 25 Marks. - 25 marks. III) Total (1 + II) = 25 Marks. • External Sessional Assessment: - 25 marks. - 25 marks. External Sessional Assessment: - 25 marks. 01 Identify the different engine & chassis components which may fail due to stress 02 oncentration, observe & state remedy to reduce stress concentration. 02 Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 02 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle 08 joint) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD Indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 08 opsigin any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall di		5) Use CAD software to draw automobile components.	
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 Continuous Internal Sessional Assessment:25 marks. Attending classes, doing practicals & submitting respective note book in time = 20 marks.	Еланна	tion scheme. Flactical formal Assessment 25 merels	viui ks . 50
1) Attending classes, ability practicals & submitting respective note book in time = 20 marks.	<i>I</i>) <i>A</i>	Continuous Internal Sessional Assessment: 25 marks.	
III) VIVa-VOCE = 05 marks III) Total (I + II) = 25 Marks. • External Sessional Assessment: -25 marks. Examiner : External Teacher [Lect.] SI. No. List of Design Practical [for Continuous Internal Assessment] Hours 01 Identify the different engine & chassis components which may fail due to stress concentration, observe & state remedy to reduce stress concentration. 02 Outs of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle joint) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface [nish, also Prepare bill of material. 08 Of Design any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 01 Of DESign of Power train [for a given engine power]: (Piston, Piston rings, piston pin, connecting rod, crankshaft) BESIGN PROJECT: (any one) 12 A. Design of Fransmission train [for a given engine power]: (Chuch, teethcalculations of gear box, propeller shaft and rear a	I) At	tending classes, doing practicals & submitting respective note book in time = 20 .	marks.
10) Total (++11) = 25 Marks. • External Sessional Assessment: -25 marks. Examiner : External Teacher [Lect.] SI. No. List of Design Practical [for Continuous Internal Assessment] 01 Identify the different engine & chassis components which may fail due to stress concentration, observe & state remedy to reduce stress concentration. 02 Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc. 02 03 Design any one machine elements (socket & spigot type cotter joint / Knuckle joint) for specified data, select suitable materials, prepare assembly-detail, drawing one on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 08 04 Design any one coupling (Muff coupling / bush pin type flexible coupling) for specified data, select suitable materials, prepare assembly-detail, drawing overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material. 08 05 DESIGN PROJECT: (any one) 12 A. Design of Power train [for a given engine power]: (Piston, Piston rings, piston pin, connecting rod, crankshaft) 12 B. Design of Transmission train [for a given engine power]: (clutch, teethcalculations of gear box, propeller shaft and rear axle). 32 hrs. Note:: Total Periods 32 hrs. Note: > Design project activity should be completed in a small group of 5-6 students. > Us		II) VIVA-VOCE = US marks $III) Tatal (I + II) = 25 Marks$	
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Image: dimensions, tolerances, hardness & surface finish. Total Periods 32 hrs. Note :- > Design project activity should be completed in a small group of 5-6 students. > > Use of design data book is compulsory. Scheme for continuous Internal Assessment: Total Marks = 25. Sl. No.(01 & 02) = 5 marks, Sl. No. (03 & 04) = 10 (i.e.5x2) marks & Sl. No. 05 = 10 marks.		Notes: Select suitable materials, prepare drawing indicating overall	
Total Periods 32 hrs. Note :- > ▶ Design project activity should be completed in a small group of 5-6 students. ▶ Use of design data book is compulsory. Scheme for continuous Internal Assessment: Total Marks = 25. Sl. No.(01 & 02) = 5 marks, Sl. No. (03 & 04) = 10 (i.e.5x2) marks & Sl. No. 05 = 10 marks. Learning Resources :		dimensions, tolerances, hardness &surface finish.	
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 Design project activity should be completed in a small group of 5-6 students. Use of design data book is compulsory. Scheme for continuous Internal Assessment: Total Marks = 25. Sl. No. (01 & 02) = 5 marks, Sl. No. (03 & 04) = 10 (i.e.5x2) marks & Sl. No. 05 = 10 marks. 		Note:-	4.5
Use of design data book is compulsory. Scheme for continuous Internal Assessment: Total Marks = 25. Sl. No.(01 & 02) = 5 marks, Sl. No. (03 & 04) = 10 (i.e.5x2) marks & Sl. No. 05 = 10 marks. Learning Resources :		Design project activity should be completed in a small group of 5-6 studen	IS.
Scheme for continuous Internal Assessment: Total Marks = 25. Sl. No.(01 & 02) = 5 marks, Sl. No. (03 & 04) = 10 (i.e.5x2) marks & Sl. No. 05 = 10 marks. Learning Resources :		> Use of design data book is compulsory.	
SI. $NO.(01 \approx 02) = 5$ marks, SI. $NO.(05 \approx 04) = 10$ (1.e.5x2) marks & SI. $NO.05 = 10$ marks. Learning Resources :	C1) 1	Scheme for continuous Internal Assessment: Total Marks = 25.	
Learning Resources :	$\mathcal{Sl}. N$	$D_{1}(01 \propto 02) = 3$ marks, Sl. No. $(03 \propto 04) = 10$ (l.e. $Sx2$) marks $\propto Sl.$ No. $03 = 10$ m	narks.
		Learning Resources :	

Tout Dooks					
	Text Books :				
Author	Title	Publisher			
P C Sharma & D K Aggarwal	Machine Design	S K KATARIA & sons			
R.S.Khurmi & J.K.Gupta	Machine Design	Eurasia Publication House			
R.K.Jain	Machine Design	Khanna publication			
Pandya & shah	Machine Design	Dhanpat rai & sons			
U.C. Jindal	Machine Design	Pearson			
R B Gupta	Auto design	Satya prakashan			
V.B.Bhandari	Design of Machine Elements	Mc. Graw Hill			
N.K Giri.	Problems in Automobile Engineering	Khanna publication			
K M Aggarwal	Auto design problems	Satya prakashan			
Griles	Automobile Design Vol,2,3				
J.E. Shigley	Machine Design	McGraw Hill			
	Design data Book	P S G Coimbatore			

Automobile Chassis-II (PAE-502)

Name of the Course : Diploma in A	Automobile Engineering				
Course Code: AE	Semester :	Fifth			
Duration: 17 Weeks	Maximum Marks :	100 Marks			
Teaching Scheme :	Examination Scheme :				
Theory: 3 hrs / week	Internal Examination :	20 Marks			
Tutorial: Nil	T.A [Attendance, Assignment & Interaction]:				
		10 Marks			
Practical: 2 hrs / week	End Semester Exam :	70 Marks			
Credit : 3					
Aims :					
• To impart knowledge to constr	uction, working and functions	o f Automobile Systems.			
 To impart knowledge concerned to Automobile Component Design, Vehicle maintenance, vehicle testing. 					
• To impart knowledge concerne	ed to latest developments in bra	iking system.			
Objectives:	-				
Students will be able to:					
1. Understand construction, work	ing and functions of Automobi	le control systems such as Air			
Conditioning, steering, braking	g and suspension.				
2. Understand construction and v	vorking of different braking sys	stem.			
3. Know the comfort conditions of	f the occupants.				
4. Understand the effects of resist	tances on a vehicle.				
5. Understand the various types v	wheels and its' specification.				
Pre-requisite :-					
Content [Theory] :					
Chapter Na	nme of the Topic	Hours Marks			

	Brakes and Braking system:		
	1.1 Introduction, Principle of braking.	11	
	1.2 Function and necessity of brakes, Braking Effect- weight transfer.		
01	1.3 Classification of brakes and braking systems.		
01	1.4 Construction and working of - Drum brake.		
	1.5 Concept of Leading Shoe & Trailing Shoe.		
	1.6 Friction materials used for brake shoes and pads.		
	Characteristics of friction material- brake fade, coefficient		
	offriction, dry friction and wet friction.		
	1.7 Disc brake, types, construction and working principle, use.		
	1.8 Solid and ventilated disk brakes.		
	1.9 Comparison between Drum Brake and Disc Brakes		
	1.10 Construction and working of - Mechanical braking system.		
	1.11 Hydraulic Braking system, construction & working principle.		
	1.12Master cylinder, wheel cylinder construction & working principle,		
	bleeding of Brakes.		
	1.13 Properties of Brake Fluid and their specifications.		

	1.14 Air braking system - construction and working principle.1.15 Parking brake, Adjustments of Brakes, Brake Test.		
	1.16 Brake System Troubleshooting.		
02	 Power Brakes: 2.1 Necessity of Power Brakes, Types of Power Brakes. 2.2 Construction and working principle of power brakes (pedal assisted & combined unit type). 2.3 Hydraulic operated air braking system and vacuum assisted braking system, vacuum pump, manifold vacuum 2.4 Concept and working of Antilock Brake System (ABS). 2.5 Power Brake Troubleshooting. 	06	
03	 Suspension Systems: 3.1 Functions of suspension system. Sprung weight, unsprung weight. 3.2 Types of suspension system - Rigid and independent Suspension. 3.3 Types of Independent suspension system - McPherson strut and Wishbone type. 3.4 Semi-elliptical Leaf spring, Helper springs (variable rate springs), coil spring , torsion bar arrangement, 3.5 Construction and working of Air Suspension System. 3.6 Construction and working of-Shock absorbers -Telescopic and Gas filled. 3.7 Comparison between Rigid and independent Suspension. 3.8 Anti roll bar or stabilizer bar. 	09	
04	 Wheels and Tyres: 4.1 Wheels: Functions, Wheel Specification, Types of wheels-wired spoke wheel, disc and alloy Wheels. 4.2 Tyres: Necessity of tyres, Construction, working and comparison of a Tubed tyre and Tubeless tyres. 4.3 Types of Tyres -radial, cross ply & belted bias type. 4.4 Specification of tyres, concept of Aspect ratio. 4.5 Types of tread patterns 4.6 Effect of inflation pressure on the life of tyre and tyre rotation. 4.7 Factors affecting tyre performance and life. 4.8 Balancing of wheel tyre assembling (static and dynamic). a. Tyre Rotation. b. Tyre Retreading. c. Tube Vulcanizing. 	09	

05	Automotive air conditioning System:	07	
	5.1 Principles of automotive air conditioning.		
	5.2 Layout and operation of Heating, Ventilation and Air		
	Conditioning System (HVAC) in a vehicle.		
	5.3 Type of refrigerants used in car air conditioning and their		
	properties.		
	5.4 Human comfort conditions.		
	5.5 Temperature control system, humidity control.		
	5.6 Causes of failure of automotive air conditioners.		

06	Vehicle Performance & Safety Devices:	06	
	6.1 Resistance faced by the vehicle- Air resistance, rolling resistance, gradient resistance.		
	6.2 Definitions- traction, tractive efforts, drawbar pull, gradeability, acceleration, pitching, bouncing, rolling, sway and yaw.		
	6.3 Stability of vehicle on turn and slopes		
	6.4 Safety devices -air bags, exhaust brake, emergency brake,		
	central locking, Safety Belts.		
Total		48	70
		hrs	Marks
Total C	lasses	17	weeks
		[51 lec	ture hrs]
Practica	1:	1	

SL. No.	Skills to be developed					
01	Intellectual Skills:					
	• To develop knowledge to Select proper tools and their range.					
	• To develop knowledge on construction and working of the system under consideration					
• To develop knowledge on safety and performance of the vehicles.						
02	Motor Skills:					
	Students will be able to:					
	✓ Sketch the different systems and their components					
	✓ Handle tools, equipment and instruments.					
	✓ Dismantle and assemble various system assemblies.					
Examinatio	n Scheme : Practical Maximum Marks : 50					
	Continuous Internal Assessment: - 25 marks.					
I) Attending	g classes, doing practicals & submitting respective report in time $= 20$ marks.					
II) Viva-Voo	ce = 05 marks					
III) Total (I	+ II) = 25 Marks.					
	• External Assessment: – 25 marks.					
	Examiner : External Lecturer.					

Total Periods : 32 hrs.

List of Practicals:

Skills to be developed :

- 1. Know your Automobile Systems laboratory through, listing the systems, working models, and charts in laboratory with their purpose.
 - Listing the tools used in dismantling and assembly of various Automobile systems.
- 2. Observe and draw the layout of hydraulic braking system. Dismantle master cylinder, wheel cylinder and remove brake drum, identify and sketch the components and assemble it.
- 3. Observe and draw the layout of Air braking system. Dismantle all the components like Brake valve, proportionate valve, wheel cylinder and remove brake drum, identify and sketch the components and assemble it.
- 4. Observe and draw the layout of hydraulically operated air/vacuum assisted braking system.
- 5. Observe and sketch the construction of Mc. Pherson and wishbone type suspension with label.
- 6. Study the working principle and Testing of Anti Lock Braking (ABS) system.
- 7. Dismantle semi elliptical leaf spring, sketch its components with labels and understand its working.
- 8. Dismantle telescopic shock absorber, identify components and draw sketches of components with labels and understand its working principle.
- 9. Observe and draw the layout of automobile Air conditioning system. Measure the ambient temperature and temperature at various locations inside the car. Describe the control systems.

Notes:

- 1. The practicals shall be performed with a small group of students.
- 2. Multiple practicals will be conducted simultaneously with different groups.

Examination Scheme: Theoretical

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Group	Chapter		Objective Que	estions	Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	05	A my twonty	01	$20 \times 1 - 20$
В	03 & 04	10	Any twenty	UI	$20 \times 1 = 20$
С	05 & 06	05			
				·	
Group	Chapter	Subjective Questions			Total Marks

Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	03	Any fine	10	$10 \times 5 - 50$
В	03 & 04	05	Any five	10	$10 \times 5 = 50$
C	05 & 06	03			
	·	•	•		•

Learning Resources :						
Text Books :						
Author	Title	Publisher				
Dr. Kirpal Singh	Automobile Engg. Vol1	Standard Publishers				
R.B. Gupta	Automobile Engineering	Satya Prakashan				

Crouse & Angline	Automotive Mechanics	Tata McGraw Hill
Joseph Heitner	Automotive Mechanics	East West Press, New Delhi
John B. Heywood	Internal Combustion Engine Fundamentals	McGraw-Hill International Edition
Automotive Mechanics	N.K. Giri vol-2	Khanna Publishers, New Delhi
K.K. Ramlingam	Automobile Engineering	Scitech Publications