

UNIVERSITY OF PETROLEUM & ENERGY STUDIES
END SEMESTER- December, 2017

Semester	: III	Duration	: 3Hr.
Programme	: B.Tech-Automotive Design Engineering	Max.Marks	: 100
Course Code	: ADEG 203	Total Pages	:
Course Title	: Components of Automotive Chassis		

SECTION – A

Answer all Questions, All Questions carries equal marks [5 X 04M = 20 Marks]

Q.1 Designate the Bias belted tyre used for the passenger cars for the following dimensions

- | | | | |
|----|---|---|----------|
| a. | Width of the tyre | - | 195 mm |
| b. | Aspect ratio | - | 55 |
| c. | Rim diameter | - | 18" |
| d. | load carrying capacity at 2.3 bar inflation Pressure is | - | 625 kg |
| e. | Maximum speed of the vehicle is | - | 210 KMPH |

Also calculate the section height of the tyre.

(Choose the suitable data from the Load Index & Speed Index sheet shown in Annexure –I)

Q.2 composition of steel frame material used in automobile is mentioned below

Carbon	:	0.25-0.35%
Manganese	:	0.35-0.75%
Silicon	:	0.30 %Maximum
Phosphorous	:	0.05% Maximum
Sulphur	:	0.5 % Maximum.

Define the role of each material

Q.3 identify the following steering cases mentioned in fig.1, 2 and 3 and provide their significance.

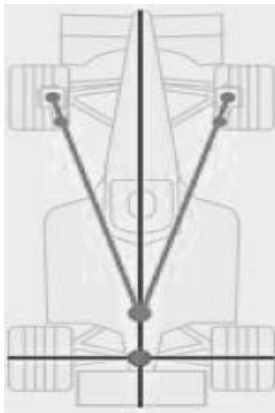


Figure 1

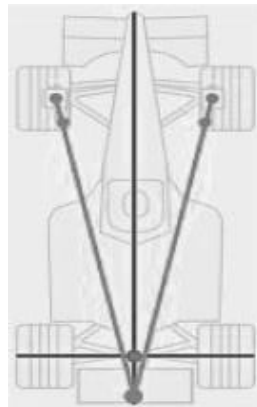


Figure 2

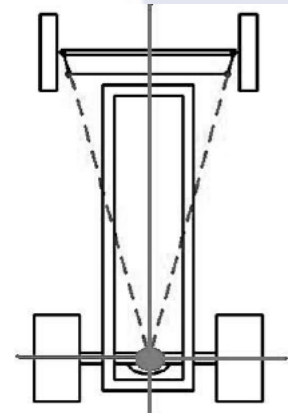


Figure 3

Q.4 Identify and label the following mechanism shown in figure 4

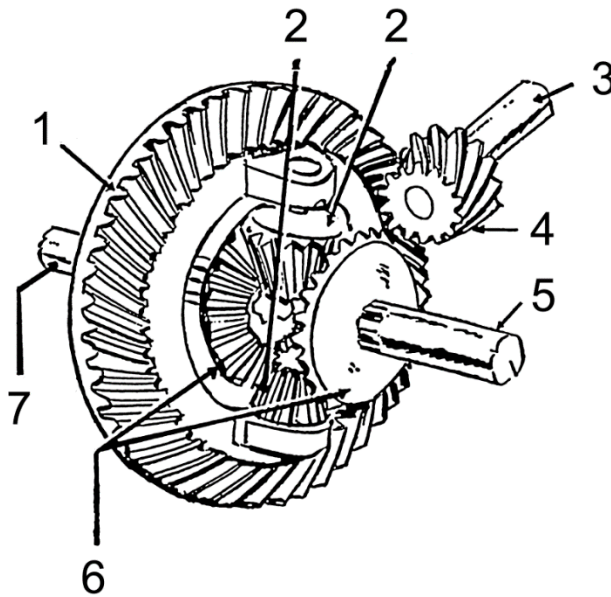


Figure 4

SECTION - B

Answer all Questions, All Questions carries equal marks [4 X 10M = 40 Marks]

Q.5 If vehicle is running at 60 kmph, engine RPM is 3000 and vehicle is in third gear and overdrive mode of the vehicle is activated. Overdrive ratio is 0.6: 1. Find percent difference between engine and drive shaft speed.

If vehicle is in top gear and if drive shaft is running at 3000 RPM then what will be the engine speed of the vehicle. Gear ratios of trasmission are mention below.

Gear	Ratio
1st gear	2.97:1
2nd gear	2.07:1
3rd gear	1.43:1
Top gear	1.00:1

Q.6 Distinguish between semi floating and fully floating rear axles with the help of suitable sketch.

Q.7 Analyze the Camber vs. Tyre traction with road for the following conditions

- A. Transverse equal length wishbone
- B. Transverse unequal length wishbone

Q.8 Two suspension systems shown in the figures 5 and 6 compare it on the basis of

- a) Physical appearance
- b) Quality of ride
- c) Working
- d) Jounce and rebound effect.

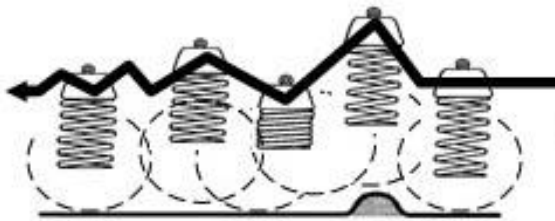


Figure 5

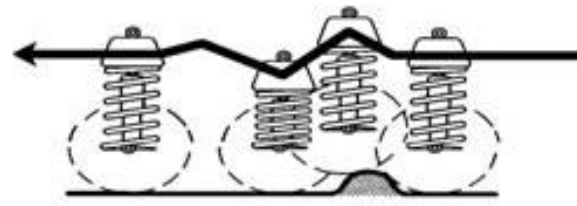


Figure 6

SECTION – C

Answer all Questions, All Questions carries equal marks [2 X 20M = 40 Marks]

Q.9 As an engineer you have been asked to select a component for your **dreamed passenger car** from the following list mention in table 1 and 2. Justify your selections. (You may select more than one component from any columns.)

Table 1

Frame	Clutch	Transmission
1. Ladder chassis 2. Tubular space-frame 3. Monocoque 4. ULSAB monocoque 5. Carbon-fiber monocoque 6. Aluminium space-frame	1. Single plate with Diaphragm 2. Single Plate with coil spring 3. Multi plate with Diaphragm 4. Multi plate with coil spring 5. Centrifugal 6. Semi-centrifugal 7. torque Converter 8. Dual Clutch (DCT)	1. Manual 1. Sliding mesh 2. Constant mesh 3. Synchromesh 4. Combination of constant and synchromesh 2. Continuous Variable Transmission 3. Clutch less Manual Transmission 4. Overdrive 5. Differential gear box 6. Limited Slip Differential gear box

Table 2

Drive	Front and Rear Suspension	Tyres
1. Hotchkiss Drive 2. Torque tube drive	1. Leaf Spring 3. Torsion Bar 5. Double wishbone parallel and equal length link 7. Trailing Arms 9. Panhard rods 11. Hydralastic	2. Coil Spring 4. Mac-pherson Strut 6. Double wishbone parallel and unequal length links 8. Hydraulic (telescopic double acting) 10. Hydragas

OR

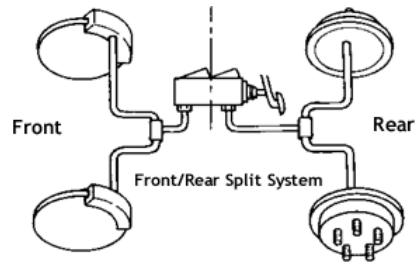
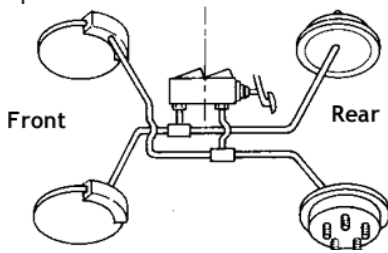
Q. 10 As an engineer you have been asked to select a component for your **Light commercial vehicle** from the following list mention in table 1 and 2. Justify your selections. (You may select more than one component from any columns.)

Q.11 A) Draw the neat sketch of tandem master cylinder used in automobile braking system

B) Explain in brief the Purpose of

1. Air vent at the cap of reservoir of master cylinder
2. Piston holes on the piston of master cylinder.
3. Brake bleeding.
4. Brake (vacuum) booster and also mention its location in the braking system.

C) Identify the following braking circuits mention below and justify with reason which one should be preferable for the Automobile vehicle.



Annexure – I

Load and Speed Index sheet for selection of Tyres

Load Index

Load index	Wheel load capacity in kg with tyre pressure measured in bars										
	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5
69	215	225	240	250	260	270	285	295	305	315	325
70	225	235	245	260	270	280	290	300	315	325	335
71	230	240	255	265	275	290	300	310	325	335	345
72	235	250	260	275	285	295	310	320	330	345	355
73	245	255	270	280	295	305	315	330	340	355	365
74	250	260	275	290	300	315	325	340	350	365	375
75	255	270	285	300	310	325	335	350	360	375	387
76	265	280	295	310	320	335	350	360	375	385	400
77	275	290	305	315	330	345	360	370	385	400	412
78	280	295	310	325	340	355	370	385	400	410	425
79	290	305	320	335	350	365	380	395	410	425	437
80	300	315	330	345	360	375	390	405	420	435	450
81	305	325	340	355	370	385	400	415	430	445	462
82	315	330	350	365	380	395	415	430	445	460	475
83	325	340	360	375	390	405	425	440	455	470	487
84	330	350	365	385	400	420	435	450	470	485	500
85	340	360	380	395	415	430	450	465	480	500	515
86	350	370	390	410	425	445	460	480	495	515	530
87	360	380	400	420	440	455	475	490	510	525	545
88	370	390	410	430	450	470	485	505	525	540	560
89	385	405	425	445	465	485	505	525	545	560	580
90	400	420	440	460	480	500	520	540	560	580	600
91	410	430	450	475	495	515	535	555	575	595	615
92	420	440	465	485	505	525	550	570	590	610	630
93	430	455	475	500	520	545	565	585	610	630	650
94	445	470	490	515	540	560	585	605	625	650	670
95	460	485	505	530	555	575	600	625	645	670	690
96	470	495	520	545	570	595	620	640	665	685	710
97	485	510	535	560	585	610	635	660	685	705	730
98	500	525	550	575	600	625	650	675	700	725	750
99	515	540	570	595	620	650	675	700	725	750	775
100	530	560	590	615	640	670	695	720	750	775	800



Speed Index

<i>Top speed of car (km h⁻¹)</i>	<i>Tyre load capacity (%)</i>		
	<i>V</i>	<i>Speed symbol W</i>	<i>Y Tyres</i>
210	100	100	100
220	97	100	100
230	94	100	100
240	91	100	100
250	-	95	100
260	-	90	100
270	-	85	100
280	-	-	95
290	-	-	90
300	-	-	85