

Name:

Enrolment No:



## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, May 2021

Programme Name: B. Tech ADE

Semester : IV

Course Name : Vehicle Technology

Time : 03 hrs

Course Code : MEAD-2003

Max. Marks: 100

Nos. of page(s) :

Instructions:

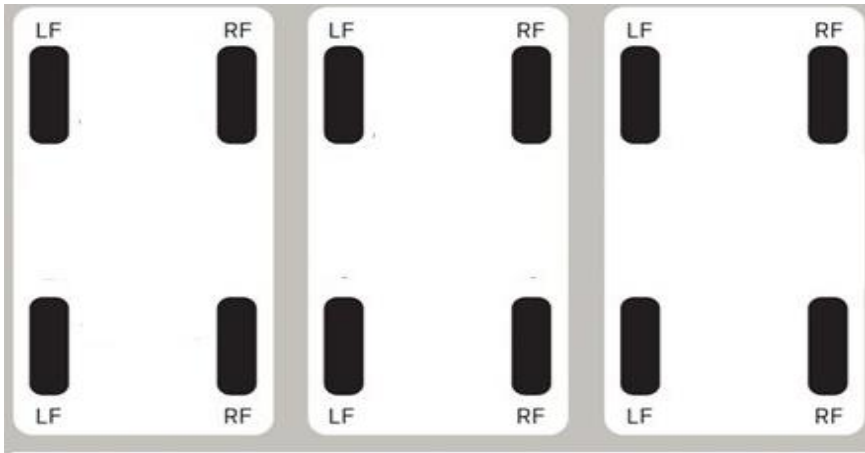
### SECTION A

#### 1. Each Question will carry 5 Marks

S.N		Marks	CO
1	<p>Designate the Bias belted tyre used for the passenger cars for the following dimensions</p> <p>a. Width of the tyre - 195 mm</p> <p>b. Aspect ratio - 55</p> <p>c. Rim diameter - 18"</p> <p>d. load carrying capacity at 2.3 bar inflation Pressure is - 625 kg</p> <p>e. Maximum speed of the vehicle is - 210 KMPH</p> <p>Also, calculate the section height of the tyre.</p> <p><b>(Choose the suitable data from the Load Index &amp; Speed Index sheet shown in Annexure –I)</b></p>	5	CO4
2	<p>Air spring is superior to conventional leaf spring, Justify.</p>	5	CO2
3	<p>Define the following term of steering geometry</p> <p>A) Camber</p> <p>B) Scrub Radius</p>	5	CO1
4	<p>A car of a mass 800 kg is travelling at 36 km/h. Determine</p> <p>A) The kinetic energy it possesses ( kJ)</p> <p>B) The average braking force (N) to bring it to rest in 20 meters.</p>	5	CO5
5	<p>Define the following term of steering geometry</p> <p>A) Brake Bleeding</p> <p>B) Clutch Fading</p>	5	CO3
6	<p>Compare the DOT 4 and DOT 5 brake fluid used in automobiles.</p>	5	CO2

**SECTION B**

- 1. Each question will carry 10 marks**  
**2. Instruction: Write short / brief notes/solve the Numerical**

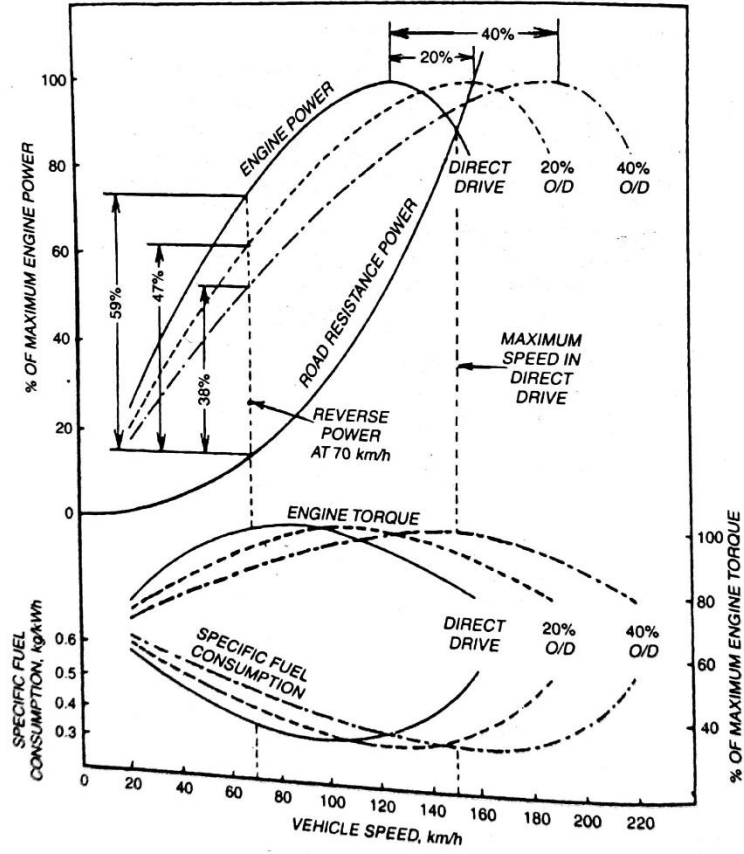
7	<p>If vehicle is running at 60 kmph, engine RPM is 3000 and vehicle is in third gear and overdrive mode of the vehicle is activated. Overdrive ratio is 0.6: 1. Find percent difference between engine and drive shaft speed.</p> <p>If vehicle is in top gear and if drive shaft is running at 3000 RPM then what will be the engine speed of the vehicle. Gear ratios of trasmission are mention below.</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Gear</th> <th style="text-align: center;">Ratio</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1st gear</td> <td style="text-align: center;">2.97:1</td> </tr> <tr> <td style="text-align: center;">2nd gear</td> <td style="text-align: center;">2.07:1</td> </tr> <tr> <td style="text-align: center;">3rd gear</td> <td style="text-align: center;">1.43:1</td> </tr> <tr> <td style="text-align: center;">Top gear</td> <td style="text-align: center;">1.00:1</td> </tr> </tbody> </table>	Gear	Ratio	1st gear	2.97:1	2nd gear	2.07:1	3rd gear	1.43:1	Top gear	1.00:1	<b>10</b>	<b>CO4</b>
Gear	Ratio												
1st gear	2.97:1												
2nd gear	2.07:1												
3rd gear	1.43:1												
Top gear	1.00:1												
8	<p>Explain in details</p> <p>A. Factors on which cornering force acting during turns depends</p> <p>B. Characteristics of oversteer and how does oversteer is considered to be dangerous in passenger cars.</p>	<b>10</b>	<b>CO1</b>										
9	<p>A) Explain the importance of “Rotation of tyre” in automobiles.</p> <p>B) In given fig 1, Kindly show the tyre rotation pattern</p> <div style="text-align: center;">  <p><b>Rear wheel drive      Front wheel Drive      Directional Tyres</b></p> </div>	<b>10</b>	<b>CO3</b>										
10	<p>The Wheel Base of a Car is 2.7m and Pivot centers are at 1m. The Wheel track is 1.2m. Calculate the correct angle outside lock and turning circle radius of the outer front and inner rear wheels when the angle of inside lock is 400.</p>	<b>10</b>	<b>CO5</b>										

11	<p>As an automotive engineer, you have been asked to select the wheel and tyre for your sport vehicle from the below mentioned available categories</p> <p><b>Tyre</b>  A. Radial  B. Bias  C. Belted bias  Directional or Non directional</p> <p><b>Wheels</b>  A. Disc  B. Wired  C. Light alloy cast wheel</p> <p>Justify your selections.</p>	10	CO2
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**SECTION C**

- 1. Each Question carries 20 Marks.
- 2. Instruction: Write long answer.

12	<p>Develop the Road Performance Curves for the following conditions and identify points 'a' and 'b'</p> <p>a. maximum speed for a given vehicle and engine</p> <p>b. the desired speed</p> <p>Conditions:</p> <ol style="list-style-type: none"> <li>1. Total resistance (Rolling + Aerodynamic + gradient) including under full throttle conditions</li> <li>2. Power curve for lower gear at full throttle</li> <li>3. Power curve for top gear at full throttle</li> <li>4. Power curve for top gear at part-throttle</li> </ol> <p align="center"><b>OR</b></p> <p>Graph shown is Engine power, Engine torque and Fuel Consumption Vs engine speed in (Kph)</p> <p>Analyze It on the basis of following parameter.</p> <ol style="list-style-type: none"> <li>1. Compare the 20 % O/D (Overdrive) with Direct Drive</li> <li>2. Compare the 20 % O/D with 40 % O/D</li> <li>3. Overdrive is best for all categories of vehicle, true or false. Comment on it.</li> </ol>	20	CO4
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## Annexure –I

### 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

Top speed of car (km h <sup>-1</sup> )	Tyre load capacity (%)		
	V	Speed symbol W	Y Tyres
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