

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, 2021

Programme Name: B. Tech ADE

Semester : III

Course Name : Components of Automotive Chassis

Time : 03 hrs

Course Code : MEAD-2004

Max. Marks: 100

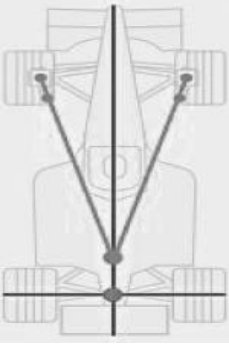
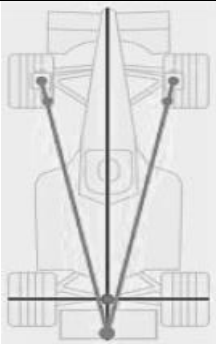
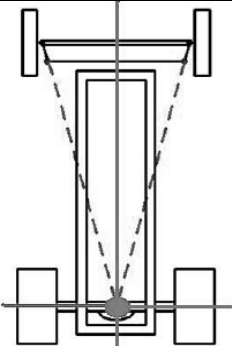
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Instructions:

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 - 205 mm</p> <p>b. Aspect ratio - 60</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>(Choose the suitable data from the Load Index & Speed Index sheet shown in Annexure –I)</p> | 5 | CO4 |
| 2 | <p>Define the following term of steering geometry with line diagram</p> <p>A) Castor</p> <p>B) Combined Angle</p> | 5 | CO2 |
| 3 | <p>Composition of steel frame material used in automobile is mentioned below</p> <p>Carbon : 0.25-0.35%</p> <p>Manganese : 0.35-0.75%</p> <p>Silicon : 0.30 % Maximum</p> <p>Phosphorous : 0.05% Maximum</p> <p>Sulphur : 0.5 % Maximum.</p> <p>Define the role of each material</p> | 5 | CO1 |
| 4 | <p>Identify the following steering cases mentioned in fig.1, 2 and 3 and provide their significance.</p> | 5 | CO5 |

| | | | | | |
|--|--|---|--|--|--|
| |  <p style="text-align: center;">Figure 1</p> |  <p style="text-align: center;">Figure 2</p> |  <p style="text-align: center;">Figure 3</p> | | |
| 5 | Briefly explain, the importance of “Dropping” provided in the front axle and compare the same with straight Front Axle without Dropping. | 5 | CO3 | | |
| SECTION B | | | | | |
| <p>1. Each question will carry 10 marks</p> <p>2. Instruction: Write short / brief notes/solve the Numerical</p> | | | | | |
| 6 | <p>Explain in brief the Purpose of following in the hydraulic braking system of automobile.</p> <ol style="list-style-type: none"> 1. Air vent at the cap of reservoir of master cylinder 2. Piston holes on the piston of master cylinder. 3. Brake bleeding | 10 | CO4 | | |
| 7 | <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> | 10 | CO1 | | |
| 8 | Draw and briefly explain the sequencing of tyres for the four wheeled, front wheel drive, right hand steering passenger vehicle with and without spare tyre provided in it. | 10 | CO3 | | |
| 9 | <p>According to new Indian safety norms, ABS is now mandatory in the road vehicles.</p> <ol style="list-style-type: none"> a. How does it affect the safety performance of vehicle? b. Compare it with the conventional braking system. | 10 | CO5 | | |
| SECTION C | | | | | |
| <p>1. Each Question carries 20 Marks.</p> <p>2. Instruction: Write long answer.</p> | | | | | |
| 10 | 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.) | 20 | CO5 | | |

| 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. Sliding mesh 2. Constant mesh 3. Synchromesh 4. Combination of constant and synchromesh 5. Continuous Variable Transmission 6. Clutchless manual Transmission 7. Overdrive 8. Differential gear box 9. Limited Slip Differential gear box |
| Table 2 | | |
| Drive | Front and Rear Suspension | |
| 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 |
| 11 | 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.) | |

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 ⁻¹) | 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 |