MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : AUE-504A

AUTOMOTIVE CHASSIS

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Coil springs absorb shocks by

a) Bending b) Twisting

c) Compression d) Tension.

ii) The following represents the correct specification of a type

a) 155-80-R-13 b) R-155-80-13

c) 155-80-13-R d) 155-R-80-13.

iii) The stabilizers (sway bars) are

a) alloy steel bars

b) used to connect shock absorber operating arms

c) placed parallel to cross members

d) all of these.

iv) Helper springs are usually used

a) in heavy vehicles in suspension system to obtain a two stage spring rate

b) in vehicles to improve the load capacity of suspension system

c) to stiffen the suspension

v) In a vehicle with torque tube drive, the rear suspension spring

a) takes up driving thrust and torque reaction

b) supports load and takes up end thrust

c) takes up end thrust and torque reaction.

vi) The amount of Camber is generally kept between

a) 0° to 1.5° b) 5° to 7.5°

c) 10° to 12.5° d) 15° to 18°.

vii) The brake bleeding process removes from system

a) Air b) Vacuum

c) excess fluid d) excess pressure.

viii) If the specification of a Vehicle tyre is 175/80 R 13 then

a) the tyre is radial suitable for 13 inches diameter Rim, having overall width 175 mm & Aspect ratio 80.

b) the tyre is cross-ply suitable for 13 inches diameter Rim, having overall width 175mm & Aspect ratio 80 mm.

c) the tyre is cross-ply suitable for all size diameter Rim, having overall width 175mm & tyre section height is 80 mm.

d) none of these.

ix) Energy stored per unit volume is greater in case of

a) Leaf Spring b) Coil Spring

c) Same for two d) none of these.

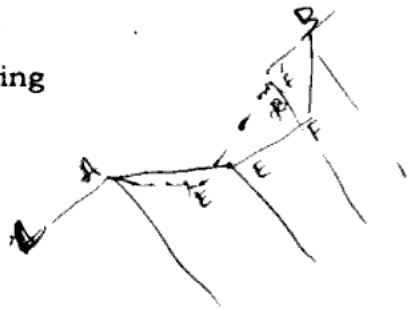
x) Sliding pair is used in

a) Ackermann Steering

b) Davis Steering

c) both of these

d) none of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Describe the inner details of a Vehicle tyre with a neat sketch.

3. Derive and explain the basic equation of Ackermann steering mechanism with a neat sketch.

4. Explain with a neat sketch :

i) Camber angle, ii) King pin inclination, iii) toe in & iv) toe out.

5. Describe briefly single acting Shock absorber.

6. Explain the different types of stub axles with neat sketch.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Describe leading shoe and trailing shoe of a drum brake with a neat sketch.

b) A car weighs 13 kN and has a wheel base of 2.5m. The centre of gravity of the car is 1.2m in front of the rear axle and is 80 cm above the level. The car is having brakes on all four wheels. The co-efficient of adhesion between the road and the wheels is 0.5. If the car is moving up an inclination, whose sin is equal to 0.1.

Calculate :

i) Lad disctibution between Rear and Front Axle.

ii) The distance at which it can be stopped while going at a speed of 50 kmph. Establish the expression you have used. 5 + 5 + 5

8. a) Draw a neat sketch of a propeller shaft with slider joint and universal joints and explain its function.

b) A bus has wheel base 5m and pivot centre distance 1.5m, turns when inner front wheel stub axel making an a angle of 65° with centre line of bus. Calculate turning circle radius of all wheels. Assume wheels are placed 150mm apart from pivot point. 5 + 10

9. a) Discuss different types of Independent Front Suspension system.

b) Describe different kinds of Load coming on the chassis.

c) Explain with a neat sketch Angle of approach, Angle of Departure and Ramp Break over angle for a vehicle. 5 + 5 + 5

10. a) A typical automotive coil suspension spring has 10 effective coil of a mean diameter 130mm and made out of wires of 16 mm diameter. The spring is designed to carry a maximum static load of 3531.6N. Calculate shear stress and deflection under these load conditions. If maximum shear stress of 637650kN/m^2 is allowable in the material. What is the possible clearance in the spring ? Take value of G =73575 × 10^3 kPa. 10

b) What is the condition of true rolling on a circular path ? 5

11. a) Discuss different types of leaf spring ? 5

b) Describe briefly, single acting shock absorber. 4

c) With neat sketch describe the construction and function of telescopic type shock absorber. 6