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CS/B.Tech/(AUE-NEW)/SEM-5/AUE-504(A)/2013-14

2013

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) In drum type brakes the fluid on releasing return to the master cylinder due to the action of the piston return spring and

a) by passort

b) wheel cylinder spring

c) compensation port

d) brake shoe retractor spring.

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ii) Most anti-skid devices are employed on

a) rear brakes

b) front brakes

c) secondary brakes

d) parking brakes.

iii) The brake bleeding process removes from system

a) Air b) Vacuum

c) Excess fluid d) Excess pressure.

iv) Energy stored per unit volume is greater than in case of

a) leaf spring b) coil spring

c) same for (a) & (b) d) none of these.

v) Brake living consists mainly of

a) Asbestos b) Copper

c) Cast iron d) Aluminium.

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vi) Most popular manual steering gear for car is

a) Rack & pinion type

b) Worm and wheel

c) Car and roller type

d) Worm & nut type.

vii) Sliding pair is used in

a) Ackermann steering

b) Davis steering

c) Both cases

d) none of these.

viii) When a vehicle turns a corner, the action of the differential causes

a) the inner wheel to speed up

b) the outer wheel to speed up

c) increase in torque applied to inner wheel

d) increase in torque applied to outer wheel.

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ix) The crown wheel and pinion is called the

a) differential b) rear axle

c) final drive d) rear drive.

x) LEMOINE is a kind of

a) Axle beam b) King pin

c) Stub axle d) Chassis frame.

GROUP – B
(Short Answer Type Questions)

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

2. What are the advantages and disadvantages of hydraulic brake system ?

3. What is the function of steering gear box ? Describe rack and pinion type gear box with neat sketch.

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

5. Discuss about torsion bar.

6. What is slip angle ? Describe over steer and under steer of a vehicle.

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GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. 3 × 15 = 45

7. a) A motor car having wheel base of 2.6 m, the height of C.G. above the ground is 0.61 m and it is 1.12 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, coefficient of friction between the road and tyre is 0.6. When

   i) the rear wheels are braked

   ii) the front wheels are braked

   iii) all the wheels are braked.

   b) Describe different types of chassis layout with neat sketches showing power plant location and drives. 10 + 5

8. a) What are the advantages and disadvantages of front mounted front wheel drive engine ?

   b) Describe the Camber angle, toe in & toe out.

   c) With neat sketch describe the construction and function of telescopic type shock absorber. 5 + 5 + 5

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9. a) In a differential of an automobile the number of teeth at differential pinion and gears are follows :

   No. of teeth in drive pinion = 30

   No. of teeth in ring gear = 60

   No. of teeth in sun gear = 28

   No. of teeth in planet gear = 24

   Each gear has a module of 10 mm. Determine the number of revolution of drive pinion for 1 revolution of left hand sun gear. When

   i) Both sun gears have same speed in same direction

   ii) Both sun gears have same speed in opposite direction

   iii) L.H.S. gear makes 48 rpm when R.H.S. gear is at rest.

   iv) L.H.S. gear makes 48 rpm when R.H.S. gear rotates at 24 rpm in same direction. 8

   b) Discuss the working principle of differential with neat sketch. 7

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10. a) What is the condition of true rolling on a circular path ? 3

b) Derive and explain the equation of Davis steering mechanism with neat sketch. 6

c) A track has pivot point 1.37 m apart, the length of each track arm is 0.18 m & the track rod is behind front axle and 1.27 m long. Determine the wheel base which will give true rolling for all wheels when the car is turning so that the inner wheel hub axle is 60° to the centre line of the car. A geometrical construction may be used. 6

11. a) A bus has wheel base 5545 mm & pivot centre distance 1700 mm. When it turns the inner front wheel stub axle making an angle of 60° with the centre line of the bus. Calculate turning cycle radius of all wheels. Assume wheels are placed 150 mm apart from pivot point. 7

b) Compare the merits and demerits of front mounted rear wheel drive with front mounted front wheel drive vehicle. Name some models of the vehicle used in India of the above types. 8

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