Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(AUE)(N)/SEM-5/AUE-504(A)/2012-13

2012
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) The function of a universal joint is to allow the propeller shaft to

      a) change length

      b) bend sideways

      c) transfer torque at an angle

      d) change inclination.

   ii) Air brakes are mostly used in case of

      a) Cars b) Jeeps

      c) Trucks d) Three wheelers.

   iii) During braking the push rod directly operates

      a) piston

      b) primary seal

      c) residual pressure valve

      d) compensating port.

iv) The crown wheel and pinion is called the

a) Differential b) Rear axle

c) Final drive d) Rear drive.

v) Pitman arm is a part of

a) brake b) steering system

c) gear system d) suspension system.

vi) Rotary motion of the steering wheel is converted into reciprocating motion by

a) Stub axle b) Tie rod

c) Steering box d) Steering shaft.

vii) Sliding pair is used in

a) Ackermann steering b) Davis steering

c) Both cases d) None of these.

viii) Brake lining consists mainly of

a) Asbestos b) Copper

c) Cast iron d) Aluminium.

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

a) Leaf spring b) Coil spring

c) Same for two d) None of these.

x) To prevent uneven tyre wear we should give

a) positive camber b) negative camber

c) zero camber d) none of these.

GROUP – B

(Short Answer Type Questions)

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

2. Describe different types of stub axles with neat sketch.
3. What are the basic differences between Davis and Ackermann steering mechanisms ? Give neat sketch.
4. Draw the layout of air brake system of a bus.
5. Describe the inner details of a tyre with a neat sketch.

GROUP – C

(Long Answer Type Questions)

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

6. a) Describe leading shoe and trailing shoe of a drum brake with neat sketch. 5

   b) A car weights 13 kN and has a wheel base of 2·5 metres. The centre of gravity of the car is 1·2 m in front of the rear axle and 800 mm above the ground level. The car is having brakes on all four wheels. The coefficient of adhesion between the road and the wheels is 0·5. If the car is moving up an incline of angle whose sine is equal to 0·1,

   calculate :

   (i) Load distribution between front and rear axles

   (ii) Distance at which it can be stopped while going at a speed of 50 km/hr when only rear wheel brakes are used. 10

7. a) The distance between the king-pins of a car is 1·3m. The track arms are 0·1525 m long and the length of the track rod is 1·2 m. For a track of 1·42 m and a wheel base of 2·85 m find the radius of curvature of the path followed by the near-side front wheel at which correct steering is obtained when the car is turning to the right. 10

   b) Describe power steering of a vehicle with neat sketch. 5

8. a) Describe different types of leaf spring used in automobile with neat sketch. 6

   b) A typical coil spring suspension has 10 effective coils of a mean diameter of 125 mm and made out of wires of diameter 15 mm. The spring is designed to carry a maximum static load of 3531·6 N. Calculate the shear stress and the deflection under the above loading [$G = 73575 \times 10^3$ kPa] 6

   c) How does a rigid axle suspension system differ from an independent suspension system ? 3

9. a) Write about the different kinds of rear axle shaft and hub arrangement with neat sketches. 6

   b) What are the advantages and disadvantages of rear mounted rear wheel drive engine of a vehicle ? 4

   c) Describe the different kinds of load coming on the chassis. 5