AUE-504A

AUTOMOTIVE CHASSIS

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
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. Answer all questions. 10×1 = 10

(i) The angle between tyre center line and vertical line is called

(A) camber (B) caster
(C) king pin inclination (D) toe in angle

(ii) Pitman arm is a part of

(A) chassis (B) steering system
(C) gear system (D) suspension system

(iii) During braking the push rod directly operates

(A) piston (B) primary seal
(C) residual pressure valve (D) compensating port

(iv) Brake lining consists mainly of

(A) asbestos (B) copper
(C) cast iron (D) aluminum

(v) 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

(vi) To prevent uneven tyre wear we should give

(A) positive camber (B) negative camber
(C) zero camber (D) none of these

(vii) Wheel base of a vehicle is the distance between

(A) two front wheels (B) two rear wheels
(C) rear and front axles centre lines (D) none of these

(viii) 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°

(ix) The Crown Wheel and Pinion as a set is called

(A) differential (B) rear axle
(C) final drive (D) rear drive

(x) If the specification of a Vehicle tyre is 145/70 R 13 then

(A) the tyre is radial suitable for 13 inches diameter rim, having overall width 145 mm and aspect ratio 70.
(B) the tyre is crossply suitable for 13 inches diameter rim, having overall width 145 mm and aspect ratio 70 mm.
(C) the tyre is crossply suitable for all size diameter rim, having overall width 145 mm and tyre section height is 70 mm.

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

2. What is the function of the chassis frame?

3. What are the advantages and disadvantages of front mounted front wheel drive engine?

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. Describe power steering of a vehicle with neat sketch.

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

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

   (b) A car weighs 14 kN and has a wheel base of 2.6 m. The centre of gravity of the car is 1.2 m 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 10
   (i) Load distribution between Rear and Front Axle.
   (ii) The distance at which it can be stopped while going at a speed of 60 kmph. Establish the expression you have used.

8. (a) Derive an expression for the stopping distance in meter of a truck equipped with all wheel brakes in terms of the coefficient of friction and speed in km/h. Calculate the value of coefficient of friction if the vehicle is stopped in 28.45 m from 64 km/h. If the coefficient of friction is reduced to 0.3 by rain, what will be the stopping distance? 10

   (b) How does a rigid axle suspension system differ from an independent suspension system? 5

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

   (b) The wheel base of a car is 2.7 m and pivot centre are at 1 meter. The wheel track is 1.3 metre. Calculate the correct angle of outer front wheel lock and turning circle radius of outer front and inner rear wheels when the angle of inside front wheel lock is 40°.

10. (a) What is the function of steering box? Describe and explain steering linkage for front axle suspension with a neat sketch.

   (b) The distance between king pins of a car is 1.4 m. The track arms are 0.16 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 rear side front wheel at which correct steering is obtained when the car is turning to the right.

11. (a) What is slip angle? Describe oversteer and understeer of a vehicle.

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

   Number of teeth in drive pinion = 30
   Number of teeth in ring gear = 60
   Number of teeth in sun gear = 28
   Number 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 50 rpm when R.H.S. gear is at rest.
   (iv) L.H.S. gear makes 56 rpm when R.H.S. gear rotates at 28 rpm in same direction.