



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH(AUE)/SEM-5/AUE-505/2011-12

2011

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) For same cross-section, bending stiffness is maximum for
 - a) square bar
 - b) round bar
 - c) round hollow tube
 - d) square hollow section.
 - ii) A rack and pinion steering gear has a tooth pinion of 10mm pitch. If an effort of 20N is applied by 490mm diameter steering wheel, the movement ratio is
 - a) 20
 - b) 22
 - c) 2.2
 - d) π .



- iii) If brake wheels get locked before the vehicle stops, the vehicle is said to be
- a) slipping
 - b) rubbing
 - c) sliding
 - d) rolling
 - e) skidding.
- iv) The crown wheel and pinion is called
- a) Differential
 - b) Rear axle
 - c) Final drive
 - d) Rear drive.
- v) 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.
- vi) The angle between tyre center line and vertical line is called
- a) Camber
 - b) Caster
 - c) King pin inclination
 - d) Toe in angle.



vii) Pitman arm is a part of

- a) Chassis
- b) Steering system
- c) Gear system
- d) Suspension system.

viii) LEMOINE is a kind of

- a) Axel beam
- b) King pin
- c) Stub axle
- d) Chassis frame.

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) Fully floating axel is used in

- a) Passenger car
- b) Heavy vehicle
- c) Motor Cycle
- d) none of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Describe Camber angle, toe in & toe out.
3. Different types of stub axles with neat sketch.
4. Describe the different kinds of load coming on the chassis.
5. Describe ABS (antilock braking system) used in automobiles.
6. What are the advantages and disadvantages of front mounted front wheel drive engine?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Epicyclic gear is shown in figure 1. The ring rotates at 300 rpm. About the axis of the fixed wheel “s” which has 60 teeth. The three arm spider “a” as shown in the figure is driven at 180 rpm. Determine the number of teeth on the wheel “p”.

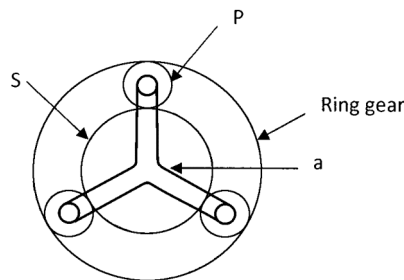
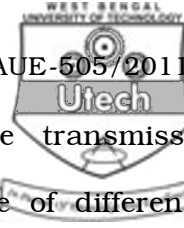


Figure 1



- b) Why is differential necessary in the transmission system? Discuss the working principle of differential with a neat sketch. 7 + 8

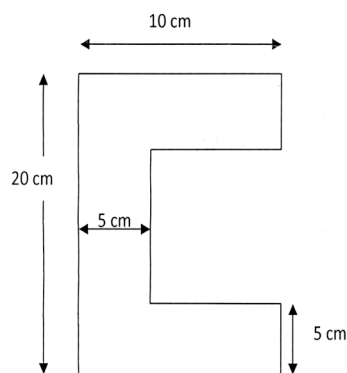
8. a) Discuss different types of leaf spring.
- b) What is the purpose of shock absorber in suspension system ?
- c) With neat sketch describe the construction and function of telescopic type shock absorber. 5 + 4 + 6
9. a) What is the condition of true rolling on a circular path?
- b) Derive and explain the equation of Davis steering mechanism with neat sketch.
- c) A track has pivot plus 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 center line of the car. A geometrical construction may be used.

3 + 6 + 6



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

b) The vehicle weight 1000 kg with having centre of gravity 1.4 m from rear axle. The maximum speed of the vehicle is 80 km/hr, when moving a curvature path of radius 75 m. The velocity of wind is 50km/hr. The chassis is of 'C'-section and shown in the figure 2.



The wheel base of vehicle = 3m

Height of Vehicle = 1.5m

Total length of the vehicle = 3.5m

Assume density of air = 1.15 kg/m^3

Figure 2

Find out the bending stress on 'C' section of the chassis of the vehicle.

5 + 10



11. a) A motor car weighs 13341.5N and has a wheel base of 2.65m. The C.G. is 1.27 behind the front axle and 0.76 m above The ground level. Maximum braking on all 4 wheels on level ground will bring the vehicle uniformly to rest from a speed of 64km/hr in a distance of 25.9m. Calculate the value of an adhesion between tyre and the road. Under the same road condition, the vehicle descends a hill a gradient 1 in 20 and is braked on the front wheel only. Determine the load distribution between front and rear wheel and the distance required to bring them to rest.
- b) What are the advantages and disadvantages of hydraulic brake system ? 10 + 5
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