# MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

## 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.*
*All symbols are of usual significance.*

### GROUP A
### (Multiple Choice Type Questions)

1. Answer *all* questions. 10×1 = 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 wheeler

(iii) In rear Wheel driven vehicle the live axle may be
(A) front axle only (B) rear axle only
(C) both (A) and (B) (D) none of these

(iv) Rotary motion of steering wheel is converted into reciprocating motion by
(A) stub axle (B) tie rod
(C) steering box (D) steering shaft





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(v) X-member of a car frame ensures improved
(A) resistance to side force due to transverse wind load
(B) bending strength of side members
(C) resistance of weaving and torsional strength of front end of frame
(D) none of these

(vi) In a passenger car a typical arrangement of braking with drum brakes will be
(A) two leading shoes at front, and leading and trailing at rear
(B) all the wheels having leading and trailing shoes
(C) front leading and trailing, rear two leading shoes
(D) none of these

(vii) A double acting shock absorber usually has
(A) unequal pressure acting on either sides
(B) equal pressure on either side
(C) both (A) and (B)
(D) none of these

(viii) The term "ply rating" with reference to a tyre refers to the
(A) actual number of piles (B) recommended inflation of pressure
(C) aspect ratio (D) rated strength

(ix) Which of the following factors is not related to the effect or independent front suspension
(A) reducing the unsprung masses (B) reducing tyre wear
(C) elimination of gyroscopic couples (D) none of these

(x) 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
(D) none of these



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## GROUP B
## (Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. Describe different kinds of chassis with respect to constructional aspect.

3. Draw the layout of air brake system of a bus.

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

5. Describe with a neat sketch the construction and function of telescopic type shock absorber.

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

## GROUP C
## (Long Answer Type Questions)

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

7. (a) Derive and explain the basic equation of Ackermann Steering mechanism with a neat sketch. 7
   (b) An automobile has a wheel base 2.743 mt and pivot centre 1.065 mt. The front and rear wheel track is 1.7 mt. Calculate the correct angle of outside lock and turning circle radius of the front outer wheel and rear inner wheel, when the angle of inside lock is 40°. 8

8. (a) Describe the Analysis of brake behavior for braking torque of leading shoe and trailing shoe with a neat sketch. 8
   (b) In an auto vehicle having 1LS and 1TS the total actuating force of 500 N acts at a distance of 160 mm from the pivots of the shoes. The shoe pivot is 80 mm from the drum axis, and the effective radius of the function force is 110 mm. The drum is of 190 mm diameter. If the shoes have symmetrical linings with co-efficient of friction as 0.4 and the actuating mechanism offers equal forces to the shoes, Calculate 7
   (i) Torque due to leading shoe
   (ii) Torque due to trailing shoe
   (iii) Total braking torque.





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9. (a) Draw and explain the function of dual piston master cylinder brake system of automobile. 6
   (b) The distance between the kink-pins of a car is 1.3 m. 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. 9

10. (a) Describe the different kinds of load coming on the chassis. 5
    (b) What are the basic differences between Davis and Ackermann steering Mechanisms? 5
    (c) What are the advantages and disadvantages of rear mounted rear wheel drive engine of a vehicle? 5

11. (a) What is the function of Steering box? Describe and explain Steering linkage for Front Axle Suspension with a neat Sketch. 6
    (b) A truck has pivot points 1.37 mt apart. The length of each track arm is 0.18 mt and track rod is behind front axle and 1.27 mt long. Determine the wheel base which will give true rolling for all the wheels when the car is turning so that the inner wheel hub axle is 60° to the centre line of the car. 9



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