ASD ASSIGNMENT

BRAKE

1. Write short note on antilock braking system.
2. Explain following:
   (1) Brake efficiency (2) Braking ratio (3) Weight transfer (4) Stopping distance
3. Describe with schematic diagram hydraulic braking system.
4. Compare Disc type brake with Drum type of brake.
5. Explain design procedure for internal expanding shoe brake.
6. Explain working of vacuum servo assisted brake.
7. Explain brake efficiency and brake fade.
8. What do you mean by Braking efficiency of vehicle? Write a short note on Vehicle testing on chassis dynamometer
9. Explain Internal Expanding shoe brake & Disk brake with neat sketch.
10. The following data is given for a caliper disk brake with annular pad for the front wheels of sports car.
Torque capacity = 450 N-m
Outer radius of pad = 150 mm
Inner radius of pad = 100 mm
Coefficient of friction = 0.4
Average pressure on pad = 1.1 N/mm2
Determine the required number of pads, if
The pads are annular segments with subtended angle of 60° per pad at the center of disk.

11. Car weighing 1450 kgf makes an emergency stop at 94 km/hr. while using brakes on all wheels. The rolling and air resistance at 94 km/hr. is 82.5 kgf total. The coefficient of adhesion is 0.5. Calculate (1) the retarding force if the brakes are applied to locking point, (2) heat flow per minute at each wheel at the beginning of braking.

STEERING SYSTEM

1. List the various types of steering gear box and explain screw and nut steering gear box with neat sketch.
2. Derive the fundamental equation for correct steering.
3. Write short note on hydraulic operated steering system.
4. Explain the Ackermann principle as applied to steering.
5. Name different types of Steering gearbox used in automobile. Explain any two with neat sketch stating its merit and limitations.
6. Explain with neat sketch Power Steering of Today's automobile

7. A vehicle with wheel base 2.14 m and front wheel track 1.22 m is provided with Ackermann steering system. The distance from the center plane of each front wheel to the nearest king pin axis is 0.11 m. while taking a turn; the inner front wheel is deflected through a maximum angle of 42°. Calculate the corresponding deflection of the outer front wheel, assuming that all the wheels are in true rolling motion. Also, find the turning radius of the outer front wheel and inner rear wheel.

DIFFERENTIAL AXLE SHAFT

1. Explain:
   (1) Full floating axle (2) Half floating axle
2. Write short note on differential and final drive.
3. What is the function of universal joints? Where are the universal joints used in automobile? List down the different types of universal joints and draw schematic diagram only.
4. Write short note on universal joint and slip joint
5. Explain different types of axles used in automobile. Give Function of Differential used in automobile.
6. Write note on (1) slip joint and(2) constant velocity universal joint
7. Explain the design consideration of the Differential.
8. Design a propeller shaft for an automobile engine developing 50 kW at 2200 r.p.m. The bottom gear ratio being 4.3 and ratio of external diameter of the shaft and its internal diameter is 1.8. Take a safe shear stress of 56 N/mm^2 for the material of shaft.

9. The load distribution between the front and the rear axle of a motor vehicle weighing 13.2 kN is such that 48% of the total load is taken by the front axle. The width of the track is 1.4 m and the distance between the centers of the spring pads is 0.66 m. Design a suitable I-section for the front axle assuming that the width of the flange and its thickness are 0.6 and 0.2 of the overall depth of the section respectively and the thickness of the web is 0.25 of the width of the flange. Assume a working stress of 90 N/mm^2.

JOHNSON

1. Discuss Johnson's method of optimum design.
2. Explain engine exhaust brake system.
3. Explain the term (1) rolling resistance (2) Air resistance
4. Give list of different types of gear box used in heavy vehicles in automobile. And explain any one.
5. Write short note on chassis dynamometer.
6. Write a short note on 1. Max speed and acceleration Relation of vehicle and 2. Durability and reliability of vehicle.
7. Explain in brief laboratory testing of following components.
   1) Braking system
   2) Automotive Clutch
   3) Suspension system

CLUTCH

1. Explain construction and working of hydraulic clutch system.
2. Which are the two theories applied to friction plates? Explain any one.
3. Write design considerations for friction clutches.
4. Write a note on
   (i) Difference between single and multi plate clutch
   (ii) Properties of clutch fluid
5. Write Explanatory notes on following:
   1) Clutch Pedal Free Play
   2) Lining Wear and Temperature
6. State the requirements of good friction lining material for clutch. Describe the different material used for same with its properties.
7. A single plate clutch, consisting of two pairs of contacting surfaces, is required to transmit 40 kW power at 1560 r.p.m. The outer diameter of the friction disk is limited to 300 mm. The coefficient of friction between the contacting surfaces is 0.3 and the intensity of pressure is limited to 0.4 N/mm2. Assume uniform wear condition and service factor is 1.25, Determine:
   (i) The inner diameter of friction disk
   (ii) Axial force required to engage the clutch
8. A centrifugal clutch with four shoes is used to transmit 12 kW at 730 r.p.m. The speed at which engagement begins is 80% of full speed. Inner diameter of the drum is 320 mm and CG of each shoe is radially at a distance of 130 mm from axis of shaft. Coefficient of friction between friction lining and drum is 0.25. The pressure exerted on shoe during engagement is 0.1 MPa. Determine:
   (i) Mass of each shoe
   (ii) Size of the shoe if the angle subtended by shoe at center is 60°.

SUSPENSION SYSTEM

1. Explain with neat sketch telescopic type suspension system.
2. With the help of sketch describe the construction of leaf spring and explain nipping of spring. Write short note on anti-roll bar.
3. Explain Independent suspension of automobile
4. Explain step by step design procedure for Leaf springs.
5. Explain step by step design procedure for coil springs.
6. Describe with the help of suitable sketches the construction and working of a Torsion Bar Suspension System.
7. A semi-elliptic multi-leaf spring is used for the suspension of the rear axle of truck. It consists of two extra full leaves and eight graduated leaves including the master leaf. The center distance between the two eyes of the spring is 1.1 m. The maximum spring force acting on the spring is 12 kN and the width of each leaf is 60 mm. The spring is pre-stressed so as to equalize stresses in all leaves. If the stresses induced corresponding to maximum load are equal to 350 MPa and the modulus of elasticity of the leaf spring is 200 GPa, Determine:
(i) The thickness of the leaves
(ii) Deflection of spring at maximum load

8. Determine the cross-section of the leaves of a carriage spring of semi-elliptical shape, used as a suspension of a truck. There are 2 full-length leaves (including master leaf) and 8 graduated leaves. Spring eyes are located at 1180 mm. Take factor of safety as 2. Maximum load on spring may be taken as 40 kN. Take σut for spring material = 1400 MPa.

9. A loaded narrow-gauge car of mass 1800 kg and moving at a velocity 72 m/min., is brought to rest by a bumper consisting of two helical steel springs of square section. The mean diameter of the coil is six times the side of the square section. In bringing the car to rest, the springs are to be compressed 200 mm. Assuming the allowable shear stress as 365 MPa and spring index of 6, find:
(1) Maximum load on each spring, (2) Side of the square section of the wire, (3) Mean diameter of coils, and (4) Number of active coils.
Take modulus of rigidity as 80 kN/mm2