PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2021 - 22 Examination

Semester: 8   Date: 01/ 04 /2022
Subject Code: 03102453 / 203102481   Time: 10:30am to 1:00pm
Subject Name: Automobile System Design   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory)   **(15)**

1. Write the function of suspension system.

2. Compare the dead and live axle.

3. State the function of differential unit.

4. Write down required properties of clutch material.

5. Define steering gear ratio.

6. Define Turning radius in steering system.

7. What do you mean by Brake fade

8. Why universal joint is provided?

9. Define Traction and Tractive effort?

10. What do you meant by Stopping Distance?

11. The following is not a Friction clutch

   (a) Fluid clutch   (b) Centrifugal clutch   (c) Cone clutch   (d) Disc clutch

12. Un-sprung weight is

   (a) Weigh of vehicle   (b) Weigh of chassis frame   (c) Weight of wheels

   (d) Weight of wheels and axles

13. Hydraulic brakes function on the principle of

   (a) Law of conservation of momentum   (b) Law of conservation of energy

   (c) Pascal's law   (d) None of the above

14. The process of removing air from the brake system is known as

   (a) bleeding   (b) self energizing   (c) servo action   (d) Pumping

15. Leaf springs absorb shocks by

   (a) bending   (b) twisting   (c) compression   (d) tension

Q.2 Answer the following questions. (Attempt any three)   **(15)**

   A) Explain leaf spring used in suspension system with sketch.

   B) Explain the step by step design procedure for Disc Brake.

   C) What is the function of front axle? Explain type of stresses encountered by front axle?

   D) Write short note on differential and final drive.

Q.3 **A) Explain the step by step design procedure for Single plate clutch.** **(07)**

B) The load distribution between the front and the rear axle of motor vehicle weighting 1350 kgf is **(08)** such that 48% of the total load is taken by the front axle. The width of the Track is 140 cm and the distance between the centers of the spring pads is 66cm. 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 0f the overall depth of the section respectively and thickness of the web 0.25 of the width of the flange. Assuming a working stress 915kgf/cm^2.

OR

B) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75   mm. If **(08)** the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm2, find the axial load which the spring can carry and the deflection per active turn.

Q.4 A) A centrifugal clutch is to be designed to transmit 15kW at 900 rpm. The shoes are four numbers. **(07)** The speed at which the engagement begins is 3/4th of the running speed. The inside radius of the pulley rim is 150mm. the shoes are lined with ferrodo for which the coefficient of friction may be taken as 0.25 determine mass of the shoes. Assume suitable data if require.

OR

A) Design a propeller shaft for an automobile engine developing 40 HP at 1500 rpm. The **(07)** bottom gear ratio being 3.2 and the ratio of external diameter to internal diameter of the propeller shaft is 1.8. Assume safe shear stress of 560 kg/cm^2 for the material of shaft.

B) Enlist types of steering system and Explain in detail Ackermann linkage theory for **(08)** steering system and their advantages.