

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (OLD) EXAMINATION – WINTER 2018****Subject Code: 170202****Date: 26/11/2018****Subject Name: Automobile System Design****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain Ackerman's theory with sketch diagram. **07**
(b) Differentiate between single plate clutch and multiplate clutch. **07**
- Q.2** (a) Explain anti-lock braking system used in modern vehicle. **07**
(b) Explain advantages and disadvantages of internal expanding brake used in vehicle. **07**

OR

- (b) A centrifugal clutch consists of four shoes, each having a mass of 1.5 kg. in the engaged position. The radius to the center of gravity of each shoe is 110mm, while the inner radius of the drum is 140mm; the coefficient of friction is 0.3. the pre-load in spring is adjusted in such a way that the spring force at beginning of engagement is 700N. the running speed is 1440 rpm calculate
1) The speed at which the engagement begins
2) The power transmitted by the clutch at 1440 rpm. **07**
- Q.3** (a) Derive require design parameters for helical-coil spring. **07**
(b) Give detail explanation of a leaf spring construction with sketch used in heavy duty vehicle. **07**

OR

- Q.3** (a) A helical spring is made from a wire of 6mm diameter and has outside diameter of 75mm. if the permissible shear stress is 350Mpa and modulus of rigidity 84kN/mm^2 , find the axial load which the spring can carry and the deflection per active turn. Wahl's stress factor may take 1.12. Assume suitable data if require. **07**
(b) List down the different types of axels and explain any one of them in detail. **07**
- Q.4** (a) Explain working and construction of hydraulic braking system in vehicle. **07**
(b) Write a short note on Air resistance and Grade resistance. **07**

OR

- Q.4** (a) Explain the rack and pinion steering gear mechanism with the suitable sketch diagram. **07**
(b) A truck has pivot pins 1.37m apart, the length of each track arm is 0.17m and the track rod is behind front axel and 1.17m long. Determine the wheel base which will give true rolling for all wheels when the car is turning so that the inner wheel stud axel is 60° to the center line of the car a geometrical construction may be used. assume necessary if require. **07**
- Q.5** (a) Write a short not on Universal joint assembly. **07**
(b) Explain the johnson's method for optimum design. **07**

OR

- Q.5** (a) Explain the double hooke's type CV joint. **07**
(b) Write a short note on Non-driving Hub. **07**
