

GUJARAT TECHNOLOGICAL UNIVERSITY
BE VII SEMESTER – • EXAMINATION – WINTER 2014

Subject Code: Automobile System Design**Date: 02/12/2014****Subject Name: 170202****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) Design a propeller shaft to transmit 270Nm torque through gear ratio 3.5. Maximum RPM at which Propeller Shaft will run when Engine will be running at 3800RPM in the Fifth gear. (Gear Ratio-0.875) **09**
- (b) Explain with neat sketch Power Steering of Today's Automobile. **05**
- Q.2** (a) Describe with schematic diagram Anti-Lock Braking system of Modern Vehicle. **07**
- (b) Explain in detail Ackermann Steering Mechanism of Automobile. **07**

OR

- (b) Write Explanatory notes on following: **07**
- 1) Clutch Pedal Free Play
 - 2) Lining Wear and Temperature
- Q.3** (a) Motor vehicle has a wheel base of 104.3 cm and pivot center of 106.5 cm. The Front and Rear wheel track is 121.7 cm. Calculate the correct angle of outside lock and turning circle radius of the outer front and inner rear wheels when the angle of inside lock is 40° . **08**
- (b) Describe with the help of suitable sketches the construction and working of a Torsion Bar Suspension System. **06**

OR

- Q.3** (a) A typical coil suspension spring has 30 effective coils of a mean diameter 100 mm and made out of wires of diameter 20 mm. Calculate maximum shear stress and deflection induced in a coil spring if it has to absorb 1000 N-m of energy. Take modulus of rigidity $G = 85\text{kN/mm}^2$. **08**
- (b) Explain the design consideration of the Differential. **06**
- Q.4** (a) A Multiple Disc Clutch, Steel on bronze, is to transmit 4.5 KW at 750 rpm. The inner radius of the contact is 40mm and outer radius of the contact is 70 mm. The Clutch operates in oil with an expected Co-efficient of 0.1. The average allowable pressure is 0.35 N/mm^2 . Find out **07**
- 1) Total number of steel and bronze discs
 - 2) The actual axial force required
 - 3) The actual average Pressure.
- (b) Write descriptive notes on the following: **07**
- 1) Slip Joint
 - 2) Constant velocity universal joints

OR

- Q.4** (a) A flywheel of 1000kg mass and 350 mm radius of gyration is rotating at 500 rpm. It is brought to rest by means of a brake. The mass of the brake drum assembly is 5 kg. The Brake drum is made of cast iron FG260 ($c = 460\text{J/kg}^\circ\text{C}$). Assuming that the total heat generated is absorbed by the brake drum only, Calculate the temperature rise. **07**

- (b) Why the clutches are usually design on the basis of Uniform Wear theory? Derive the torque transmitting capacity basis on uniform wear theory. **07**
- Q.5** (a) Explain in brief laboratory testing of following components. **07**
- 1) Braking system
 - 2) Automotive Clutch
 - 3) Suspension system
- (b) Explain with Suitable Example Johnson's Method of Optimization. **07**
- OR**
- Q.5** (a) Write descriptive note on chassis Dynamometer. **07**
- (b) Describe Adequate and Optimum design. **07**
