(b) Explain the coil spring construction in suspension system. Discuss its advantages and limitations.

(c) Discuss the construction and characteristics of single leaf spring.

Unit IV

7. What is steering error curve, and what is its significance in steering system design. Further derive the equation for true rolling motion of all the wheels of a vehicle fitted with (i) Ackerman's mechanism, (ii) Davis mechanism. **15**

8. An automobile engine develops 33.75 kW at 1500 rpm and its bottom gear ratio is 3:6:1. If a propeller shaft of 40 mm outside diameter is to be used, determine the inside diameter of the shaft, assuming a safe shear stress of 56 N/mm^2. If the length is the propeller shaft is 1.54 m, find the critical speed of the shaft. Also ascertain whether the critical speed is sufficient to avoid whirling. **15**

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B. Tech. EXAMINATION, May 2017

(Sixth Semester)

(B. Scheme) (Main & Re-appear)

AE

AE-308-B

AUTOMOTIVE CHASSIS DESIGN

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Unit I

1. Explain in detail design of single plate and multiplate clutch with neat sketches. **15**

2. (a) Why is a cone clutch more effective than plate clutch ? **3**

(b) A torque of 350 Nm is transmitted through a cone clutch having a mean diameter of 300 mm and a semi-cone angle of 15 deg. The maximum normal pressure at the mean radius is 150 kN/m^2. The coefficient of friction is 0.3. Calculate the width of the contact surface. Also find the axial force to engage the clutch. **12**

Unit II

3. Write short notes on the following : **5+10**

(a) Traction and Tractive Effort

(b) Design of three speed gear box.

4. Determine the gear ratios of a four speed gear box for a vehicle of weight 13341.6 N powered by an engine given 20.6 kW at 1800 rpm. The vehicle has a frontal area of 2.23 m^2 and has a wheel diameter of 0.71 m. The maximum gradient that the car has to negotiate is 1 in 4. The tractive resistance may be taken as 50N per 2240N of the car. The wind resistance is given $0.03679AV^2$, where A is the frontal area in m2 and V is the vehicle speed in Km/hr. Assume that the transmission efficiency is 0.75 and that at top gear, the car is expected to go over a grade of 1 in 40. State any other assumptions you make. **15**

Unit III

5. (a) What are the various stresses acting on frame members ? **5**

(b) Explain how the torsional stiffness and bending rigidity of ladder type vehicle frame may be tested in the laboratory. Supplement your answer with sketches of the test-set-up. **10**

6. (a) Discuss arrangement and working of torsion bar with neat sketch. Give its application.