Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

IV SEMESTER B.TECH (AERONAUTICAL & AUTOMOBILE ENGINEERING)
END SEMESTER MAKE-UP EXAMINATIONS, JULY 2016

SUBJECT: AUTOMOTIVE TRANSMISSION SYSTEM [AAE 2251]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Explain the constructional details and working of a semi centrifugal clutch. **(04)**

1B. Derive an expression for the critical angle for sliding down of an automobile on a slope. **(03)**

1C. Calculate the RPM of the engine if the automobile is running at 11.3KMPH.Clutch shaft pinion in the gear box has 14 teeth and the under drive main shaft gear has 30 teeth. The gears which mesh with them on the lay shaft have 32 and 18 teeth respectively. Rear axle ratio is 6:1 and overall diameter of the tires is 20cm. **(03)**

2A. Discuss with a diagram the principle of operation of a hydrostatic drive system. What are its advantages? **(04)**

2B. What are planetary gear systems? How are they classified? **(03)**

2C. Design a propeller shaft for an automobile whose engine develops 30 kW at 1500 RPM. The gear box lowest ratio is 3.2:1 and the ratio of diameters is 1.8. The working stress for the shaft material is $560X10^5 N/m^2$. **(03)**

3A. Illustrate the working principle of a frictionless differential. What are its limitations? **(04)**

3B. With a relevant diagram, show how the driving thrust is stabilized in torque tube drive systems. **(03)**

3C. What are the probable causes for (i) clutch slipping (ii) gear slipping **(03)**

4A. With a neat sketch, discuss the salient features of a semi floating rear axle. **(04)**

4B. An automobile has third gear ratio as 1.5:1 and rear axle ratio as 4.5:1. Calculate the overall gear ratio and speed of the crown wheel per minute if engine turns at 2700 RPM. **(03)**

4C. What is coupling mode of operation in a torque converter? Show schematically the details of a torque converter. **(03)**

5A. Explain the constructional details and working of a (3+1 speed) synchromesh gear box. What are its advantages? **(04)**

5B. What is the effect of flex angle on the rotation of a variable velocity universal joint? Explain with a relevant characteristic. **(02)**

5C. For a motor car, with a wheel base of 260 cm has center of gravity 80 cm above the ground and 110 cm behind the front axle has coefficient of road adhesion as 0.6. Calculate the maximum acceleration when driven on **(04)**

(i) Front wheels (ii) Rear wheels (iii) All four wheels.