Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER (MAKE UP) EXAMINATIONS JUNE 2018

SUBJECT: AUTOMOTIVE TRANSMISSION SYSTEM [AAE 2251]

REVISED CREDIT SYSTEM
(12/06/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Obtain expressions for the energy lost due to slip during engagement in friction clutches. **(04)**

1B. What is critical speed of a shaft? What is the effect of length and diameter of the shaft on its critical speed? **(02)**

1C. A clutch has 3 discs on driving shaft and 2 on the driven shaft. The inner diameter of contact surface is 120 mm. The maximum pressure between the surfaces is limited to 0.1N/mm^2. Design the clutch for transmitting 25 kW at 1575 RPM. Assume a Friction coefficient of 0.3 **(04)**

2A. With a neat sketch, illustrate the constructional details and working of a free wheel. State its applications. **(03)**

2B. What are the loads acting on live rear axles? List different types of live axles used in standard drive automobiles. **(03)**

2C. A car of mass =1500 kg has K_r= 0.01 and R_a= 0.04AV^2 , expressed in N. Frontal area= 2.3 m^2, car speed= 50 KMPH in top gear with transmission efficiency as 90 %. Final drive ratio= 4.2:1. Find the power required on level road. **(04)**

3A. Illustrate the working principle of a gear shift valve in automatic transmission systems. **(04)**

3B. Mention different types of fluid flow in a torque modifier. State which flow is dominant in different modes of operations. **(02)**

3C. Explain the working principle of gear selector and interlocking mechanism in manual transmission systems. **(04)**

4A. In a gear box the clutch shaft pinion has 14 teeth and low gear main shaft pinion 32 teeth. The corresponding lay shaft pinions have 36 and 18 teeth. The rear axle ratio is 3.7:1 and the effective radius of the rear tyre is 0.35 m. Calculate the car speed in the above arrangement at an engine speed of 2500 RPM. **(04)**

4B. What are epicyclic gear trains? List their applications and advantages. **(04)**

4C. What are constant velocity U-joints? State their applications. **(02)**

5A. Discuss the working principle of a frictionless differential. What are its limitations? **(03)**

5B. What are the probable causes for (i) Clutch judder (ii) Gear slip (iii) Drag in fluid flywheel? **(03)**

5C. Write short notes on the following. **(04)**

(i) Final drive

(ii) Over drive