Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

IVSEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

MAKEUP EXAMINATION, JUNE 2017

SUBJECT: AUTOMOTIVE TRANSMISSION SYSTEM [AAE 2251]

REVISED CREDIT SYSTEM
(12/06/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. With a relevant diagram, derive an equation for torque for Single Plate clutch. **(03)**

1B. With neat sketch explain the working and construction of Epicycle gear box. **(03)**

1C. A single plate clutch is to be designed for transmitting a maximum torque of 370 N-m .A maximum wear of facings of 5 mm is to be allowed. Design with a safety factor of 25% with a safe pressure intensity of 185 kN/m^2 normal to the surface, assuming the ratio of diameters as 0.6 .Find the dimensions of the clutch .Assume uniform wear theory. **(04)**

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

2B. With neat sketch explain the construction & working of constant mesh gear box. **(03)**

2C. Explain the working of modified ward Leonard control system & write limitation of electric drive. **(03)**

3A. Write the difference between constant velocity & variable velocity u joints. **(02)**

3B. Show how the Hydraulic circuit is used to obtain different gear ratios in automatic transmission. **(04)**

3C. What is Overdrive? List its application in automotive transmission systems and advantages. **(04)**

4A. A sliding mesh type gear box with forward speed only is to be designed. The gear box should have the following gear ratios available approximately:1 ,1.5, 2.5 and 3.9. The center distance between the lay shaft and main shaft is 78mm and the smallest gear is to have at least 16 teeth with a diametric pitch of 3.25mm .Calculate the number of teeth of the various gears and the Exact gear ratio thus available. **(04)**

4B. State the significance of slip joint. **(02)**

4C. Illustrate the working principle of a frictionless differential & write its limitation. **(04)**

5A. Write classification of axle and with neat sketch discuss the silent feature of three quarter floating rear Axle. **(04)**

5B. Explain how the diving thrust is stabilized in torque tube drive. **(03)**

5C. A Leyland truck has a gross vehicle weight of 89026 N. Engine displacement is $10m^3$, power 77.3kW at governed speed of 2400 rpm and maximum torque 345.8Nm at 1400 rpm .Rear axle ratio is 6.166:1.Fourth speed reduction ratio in transmission is 1.605:1,driveline losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm .Tyre size is 0.4572×1.016m(effective wheel diameter 0.950m),frontal area of truck $6.95m^2$.Calculate the grade which the vehicle can climb in fourth gear in still air conditions(a) at governed engine speed(b) at speed of maximum torque, in the equation ;$R=KW+K_aAV^2$ where K=0.044, K_a=0.0462 and V in km/h. **(03)**