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## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Automobile Engineering

Semester End Examination; May/June - 2019

Automotive Transmission

Time: 3 hrs

Max. Marks: 100

**Note:** i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.

ii) Missing data, if any, may be suitably assumed.

### UNIT - I

- 1 a. Discuss the requirement of clutches in an automobile. 5
- b. Explain with sketch the working principle of multiplate clutch. 7
- c. Derive an expression for effective mean radius and torque transmitted in case of a cone clutch, assuming different conditions. 8
- 2 a. Differentiate between Semi-Centrifugal and Centrifugal clutch and their necessity in automobiles. 5
- b. Discuss different clutch components and their materials. 5
- c. Determine the size of the clutch plate suitable for a car employing a single plate type of friction clutch and developing 37.5 kW at 4200 rpm. The inside diameter of the clutch plate is 0.6 times its outside diameter and it is to be ensured that even after a loss of 30% of the engine torque due to wear of the clutch facing, the clutch does not slip. The intensity of pressure on the facing is not to exceed 70 kPa. Assume  $\mu = 0.3$ . 10

### UNIT - II

- 3 a. Explain with sketch the principle of working of overrunning clutch (spring type) and its purpose in automobile. 7
- b. Differentiate between Fluid flywheel and Torque converter. 4
- c. Discuss the principle of torque multiplication in fluid flywheel. 9
- 4 a. Differentiate between the terms stage and phase used in torque converter. 4
- b. Sketch and explain the single stage torque converter. 7
- c. Sketch and explain double clutch arrangement for torque converter for improving overall transmission efficiency. 9

### UNIT - III

- 5 a. With suitable graph, discuss the necessity of transmission in a vehicle. 4
- b. Explain the following : 9
  - (i) Double declutching
  - (ii) Tractive effort
  - (iii) Traction
- c. Sketch and explain the synchronous gear box. 7

- 6 a. Differentiate between Auxiliary transmission and Compound transmission. 6
- b. A four speed gear box is to be constructed for providing the ratio of 1.0, 1.46, 2.28 and 3.93 to 1 as nearly as possible, the diametral pitch of each gear is 3.25 mm and the smallest pinion is to have at least 15 teeth. Determine the suitable number of teeth of the different gears. What is than the distance between the main and lay shaft? 14

#### UNIT - IV

- 7 a. Explain with schematic diagram the working of five speeds and reverse single stage synchronous gear box with integral final drive. 10
- b. Discuss how six different speed ratio's can be obtained by using simple epicyclic gear set? 10
- 8 a. Explain the construction and working of Ford-T-model gear box with schematic diagram. 10
- b. Discuss hydraulic gear selection control operation in planetary gear system. 10

#### UNIT - V

- 9 a. Explain with schematic diagram principle of gear selection in a 2 - speed automatic transmission. 10
- b. Explain with schematic layout the working of Borg Warner automatic transmission. 10
- 10 a. Sketch and explain the construction and working of hydromatic transmission. 10
- b. Sketch and explain transaxle three speed automatic transmission layout. 10

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