

--	--	--	--	--	--	--	--	--	--

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Automotive Transmission

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume suitable data if necessary.*

Module-1

- 1 a. Clarify the significance of a clutch in the transmission system and mention the requirements of a fine clutch. (10 Marks)
- b. Derive mathematical expressions for the torque transmitted in a multi-plate clutch with 'n' plates. (10 Marks)

OR

- 2 a. Describe the construction and working of a multi plate clutch, compare the merits and demerits over single plate clutch. (10 Marks)
- b. An automobile clutch has a clutch plate of 160 mm inside and 240 mm outside diameters. Six springs in the clutch provide a total force of 4.8 kN, when the clutch is new and each spring is compressed 5 mm. The maximum torque developed by the automobile engine is 250 Nm. Determine (i) Factor of safety for the new clutch. (ii) The amount of wear of the clutch facing that will take place before the clutch starts slipping. Assume uniform wear and coefficient of friction is 0.3. (10 Marks)

Module-2

- 3 a. Describe the construction and working of a fluid flywheel with the help of suitable diagrams, discuss the characteristics, merits and demerits. (10 Marks)
- b. Explain the construction, working and uses of sprag type overrunning clutch. (10 Marks)

OR

- 4 a. How torque converter is differing from a fluid flywheel? Discuss its advantages and disadvantages. (10 Marks)
- b. Explain the construction and working of polyphase torque converter with the help of suitable sketch. (10 Marks)

Module-3

- 5 a. Discuss different types of resistance Encountered by moving vehicle. How can there resistances be minimized? (10 Marks)
- b. A truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m^3 , Power 77.3 K W at governed speed of 2400 rpm. Maxi torque 345.8 N-m at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission 1.605 : 1 drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. The effective wheel diameter is 0.95 m. Frontal area of truck 6.95 m^2 . Calculate the grades which the vehicle can climb in fourth gear.
- (i) At governed engine speed.
- (ii) At the speed of Maxi torque. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, $42+8=50$, will be treated as malpractice.

OR

- 6 a. How are synchromesh transmissions arranged for obtained torque changes? Identify the advantages of this gear box over the constant mesh type. (10 Marks)
- b. A sliding mesh type of gear box with forward speeds only is to be designed. The gear box should have the following gear ratios available approximately : 1.0, 1.5, 2.5 and 3.9. The center distance between the lay shaft and the main shaft is 78 mm and the smallest gear is to have at least 16 teeth with a module of 3.25 mm. Calculate the number of teeth of the various gears and the exact gear ratios thus available. (10 Marks)

Module-4

- 7 a. Describe the principle of epicyclic gear train with sketch. Show that more number of gear ratios is possible from it. (10 Marks)
- b. Justify the suitability of over drive in modern cars, with figure. (10 Marks)

OR

- 8 a. Explain the working of a Wilson planetary transmission arrangement. (10 Marks)
- b. Explain the pre selective mechanisms of planetary gear system with neat sketch. (10 Marks)

Module-5

- 9 a. Explain the basic working principle of hychostatic drives. (08 Marks)
- b. Compare variable displacement pump and variable displacement motor. List out the limitations of both. (12 Marks)

OR

- 10 a. What is automatic transmission? Discuss its advantages and limitations. (10 Marks)
- b. With a neat sketch, explain the working of Borg Warner automatic transmission system. (10 Marks)
