

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Choose the type of arrangement used in synchromesh type gear box
 - a. Single plate clutch
 - b. Fluid clutch
 - c. Dog clutch
 - d. Semi-centrifugal clutch
2. A petrol engine develops 20 Nm torque at a maximum bhp speed of 3000 rpm. Determine the diameter of the impeller required to transmit the torque for a slip 3%.
 - a. 0.31 m
 - b. 0.33 m
 - c. 0.29 m
 - d. 0.27 m
3. What is the gear ratio in low reduction, If the sun gear teeth are 30 and the ring gear teeth are 75.
 - a. 3.5:1
 - b. 1.4:1
 - c. 1:1
 - d. 1:1.14
4. How much faster should a car with a Continuously Variable Transmission reach 97 kmph than the same car with the same engine and a manual transmission?
 - a. 10 percent
 - b. 25 percent
 - c. 40 percent
 - d. 60 percent
5. Draw the layout of vehicle resistance with speed and also specify the salient features.
6. Distinguish the four main differences between the single-stage torque converter and multi stage torque converter.
7. Illustrate how a gear ratio can be obtained with a single planetary gear train.
8. Compare hydrostatic drive with electric drive.

PART B - (4 X16 = 64 marks)

09. (a) Discuss in detail the construction and operation of a single plate clutch with a neat sketch. (16)

(OR)

- (b) The coefficient of rolling resistance for a truck weighing 65432 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R = KW + KaAV^2$ N, where A is m^2 of frontal area and V the speed in kmph. The transmission efficiency in top gear of 6.3: 1 is 90% and that in the second gear of 15: 1 is 80%. The frontal area is $5.8 m^2$. If the truck has to have a maximum speed of 90 kmph in top gear. (16)

Calculate: (i) The engine BP required; (ii) The engine speed if the driving wheels have an effective diameter of 0.85 m; (iii) The maximum grade the truck can negotiate at the above engine speed in second gear; and (iv) The maximum drawbar pull available on level at the above engine speed in second gear.

10. (a) Discuss the various methods used to reduce the drag force in a fluid coupling? Explain any two methods with neat sketches. (16)

(OR)

- (b) Discuss in detail about single stage torque converter with relevant sketches. (16)

11. (a) Suggest the name of the gearbox where four epicyclic trains of gears interconnected which is used to transmit the power from the engine to the rear wheel. Explain the second gear and third gear with neat sketches and deduce the gear ratios. (16)

(OR)

- (b) Mention the name of the gearbox where four magnetic clutches are used to transmit the power from the engine to the rear wheel. Discuss the construction and operation of a planetary gearbox with a neat sketch. (16)

12. (a) Discuss the various techniques that can be used to vary the engine torque continuously, when the vehicle is in running condition and explain any two with a neat sketches. (16)

(OR)

- (b) Suggest the name of the control system that can be used in the locomotives to transmit the variable speed drive electrically from a constant speed prime mover. Explain the construction and operation of a control system with a neat sketch. (16)