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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AE) (2011 Onwards) (Sem.5)

AUTOMOTIVE TRANSMISSIONS

Subject Code : BTAE-502

Paper ID : [A2062]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Write briefly :**

1. What is meant by double deducting?
2. Enlist the various methods to reduce the drag torque.
3. Why the gear ratios are arranged in geometric progression?
4. What are hydrostatic transmission combinations?
5. What are the functions of intelligent electronic control system of Toyota transmission?
6. Compare mechanical clutch with fluid coupling.
7. How the efficiency of the torque convertor varies with speed ratio?
8. Draw a flow chart for arriving of suitable gear ratio for tractor.
9. What are the limitations of electric drive?
10. Write a short note on automatic overdrive.

SECTION-B

2. Sketch and explain the variation of tractive effort with vehicle speed.
3. Explain the performance characteristics for multistage and poly phase torque converter with neat sketches. Also write any three major differences between above mentioned torque converters.
4. Compare the hydrostatic and hydrodynamic transmission.
5. What is the effect of current on variation of torque of an electric drive? Mention its advantages and limitations.
6. What is a synchronizing device? How this device helps smooth gear engagement?

SECTION-C

7. A rotor is driven by a co-axial motor through a single plate clutch, both sides of the plate being effective. The external and internal diameters of the plate are respectively 220 mm and 160 mm and the total spring load pressing the plates together is 570 N. The motor armature and shaft has a mass of 800 kg with an effective radius of gyration of 200 mm. The rotor has a mass of 1300 kg with an effective radius of gyration of 180 mm. The coefficient of friction for the clutch is 0.35. The driving motor is brought up to a speed of 1250 rpm. when the current is switched off and the clutch suddenly engaged. Determine :

- a) The final speed of motor and rotor
- b) The time to reach this speed,
- c) The kinetic energy lost during the period of slipping.

How long would slipping continue if it is assumed that a constant resisting torque of 60 N-m were present? If instead of a resisting torque, it is assumed that a constant driving torque of 60 N-m is maintained on the armature shaft, what would then be slipping time?

8. The coefficient of the rolling resistance for a truck weighing 62000 N is 0.018 and the coefficient of air resistance of 0.0276 in the formula $R = KW + K_a V^2$, where A is the frontal area of 5.57 m² and V is speed in km/hr. the transmission efficiency in top gear of 6.2:1 is 90% and that in the second gear of 15:1 is 88%. If the truck has maximum speed of 90 km/hr in top gear then calculate :
 - a) The b.p of engine
 - b) The engine speed if the driving wheels have effective diameter of 0.82 m.
 - c) The maximum grade that a truck can negotiate at the above engine speed in second gear.
9. Draw the neat sketch of a Chevrolet Turbo glide transmission and explain its salient features.