USN | | | | | | | | | | 　　　　　　　　　　　　　　　**10AU62**

Automotive Transmission

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

1. a. Explain the terms traction, traction effort and draw bar pull, with the help of performance curves. **(10 Marks)**

   b. A motor vehicle having total weight of 11144 N has road wheels of 0.01 mt effective diameter, the effective movement of inertia of four road wheel and rear axle together is 62.0 N/m^2, while that of engine and fly wheels is 6.2 N/m^2. The transmission efficiency is 90% and tractive resistance at a speed of 24 km/hr is 222.5 N, total available engine torque is 203.6 N-mt.

      i) Determine the gear ratio of engine to back axle to provide maximum acceleration on 1 in 4 grade when travelling at 24 km/hr

      ii) What is maximum acceleration

      iii) Determine the engine rpm and power under these conditions. **(10 Marks)**

2. a. Discuss the necessity of clutch, in automobiles. **(03 Marks)**

   b. List and explain the various requirements of a good clutch. **(07 Marks)**

   c. Explain the construction and working of a single plate clutch and state the advantages. **(10 Marks)**

3. a. Discuss various clutch troubles. Give reasons. **(06 Marks)**

   b. Explain the working principle of a fluid coupling. **(06 Marks)**

   c. What do you mean by over running clutch? Discuss the necessity in vehicle transmission system. **(08 Marks)**

4. a. Distinguish fluid couplings over torque converters. **(08 Marks)**

   b. Explain the typical hydrodynamic transmission system with figure, state the advantages and disadvantages. **(12 Marks)**

PART – B

5. a. What are the functions of gear box in automobiles? **(03 Marks)**

   b. Explain the construction and working of a constant mesh gear box with a line diagram, showing all the components. **(12 Marks)**

   c. What is synchroniser? State the salient features. **(05 Marks)**

6. a. Draw and explain the working of Wilson planetary gear box. **(10 Marks)**

   b. What is over drive? Explain its working with sketch **(10 Marks)**

7. a. Explain the working principle of hydrostatic drive system. **(05 Marks)**

   b. Compare constant displacement pump Vs variable displacement pump. **(07 Marks)**

   c. Discuss about the applications and limitations of hydrostatic drives. **(08 Marks)**

8. a. Explain the working of Borg–Warner automatic transmission with the help of figure. **(10 Marks)**

   b. Explain the layout of electric transmission and state the limitations. **(10 Marks)**

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Sixth Semester B.E. Degree Examination, June/July 2015
Automotive Transmission

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1 a. Explain the various resistances offered by a vehicle, with neat sketch. **(06 Marks)**

b. A motor vehicle weighes812.99 kg and its engine develops 14.7 kW at 2500 rpm. At this engine speed, the speed of the car on the top gear is 17.88m/sec. Bottom gear reduction is 3.5:1 and efficiency of transmission is 88% on top and 80% on bottom gear. The diameter of the wheel is 0.762m and Frontal area is 1.116m². Where co-efficient of rolling resistance and air resistance is 0.023 and 0.0314 calculate : i) Speed of the car on bottom gear ii) Tractive effort on top and bottom gear iii) Grade which car climb on bottom gear iv) Acceleration and tractive force at the wheels required to start – up the car on the level and attain a speed 13.41m/sec in 10 sec. (Average air resistance may be taken as half the maximum). **(14 Marks)**

2 a. Differentiate between single plate clutch and multi plate clutch. Explain with sketch any one of the above. **(08 Marks)**

b. Derive an expression for effective mean radius and torque transmitted in a single plate clutch assuming different conditions. **(08 Marks)**

c. An automobile power unit gives a maximum torque of 13.56 Nm. The clutch is a single plate dry disc type, having effective clutch lining of both sides of the plate disc. The coefficient of friction is 0.3 and maximum axial pressure is 0.829 bar and outer dia is 1.25 times the inner diameter. Calculate the dimensions of the clutch plate in mm. **(04 Marks)**

3 a. Explain with neat sketch, the working of Sprag and Roller type overrunning clutch. **(10 Marks)**

b. With neat sketch, explain the working principle of fluid coupling with their advantages. **(10 Marks)**

4 a. What is Torque converter? Explain its working with a neat sketch and state the advantages. Also discuss the performance characteristics, with graph. **(14 Marks)**

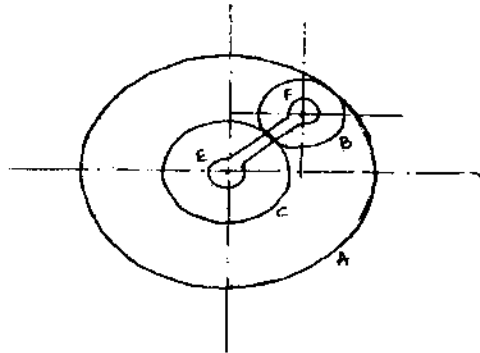b. Differentiate between torque converter and fluid couplings. **(06 Marks)**

PART - B

5 a. Explain with a neat sketch, construction and working of sliding mesh gear box giving four forward speed and one reverse speed. **(10 Marks)**

b. Design and sketch a sliding type gear box with four forward speed and one reverse speeds. Find the different speed ratios and gear teeth.
Gear ratio in top gear = 1:1 ; Gear ratio in third gear = 1.35 : 1 ;
Gear ratio in second gear = 2.25 : 1 ; Gear ratio in first gear = 3.8 : 1 ;
Gear ratio in reverse gear = 3.8 : 1.
Assume countershaft speed is half that of the engine speed and the smallest gear having 29 teeth and idler gear having 15 teeth. **(10 Marks)**

6   a.   Draw a neat sketch of epicyclic gear train and discuss the working principle with advantages.   **(10 Marks)**

      b.   An epicyclic gear consists of three wheels A, B and C as shown in figure. Wheel A has 72 internal teeth and C has 32 external teeth. The wheel B gears with both A and C is carried on an arm which rotates about the center of A at 18 rpm. If the wheel A is fixed, determine the speed of wheels B and C.   **(10 Marks)**

7   a.   List the different systems of a hydrostatic drives. Explain the principles of the same.   **(10 Marks)**

      b.   What are the advantages of an overdrive? Explain its working with neat sketch.   **(10 Marks)**

8   a.   Explain the electric transmission system with layout. What are its limitations?   **(10 Marks)**

      b.   With the help of line diagram, explain the working of Automatic transmission.   **(10 Marks)**

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