Automotive Transmission VTU CBCS Question Paper Set 2018

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10AU62

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 1.116m^2. 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)**

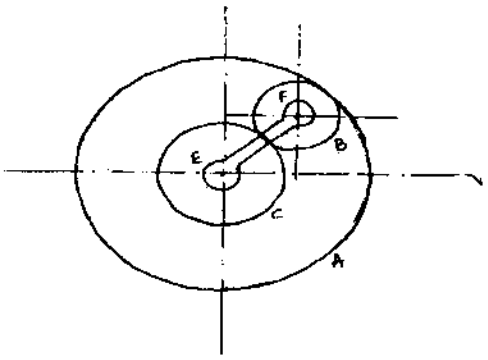
PART - B

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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Sixth Semester B.E. Degree Examination, June/July 2016
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 2017
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 following terms :
i) Traction ii) tractive effort iii) draw buspull iv) gradiability. **(10 Marks)**

b. A vehicle engine provides 40.5 b.k.w for propulsion purposes. For a certain application. The vehicle weighs 12459N is required to pull a trailer of gross weight 10673N at a speed of 57.5 km/hr in top gear on level road. The resistance to motion is given by $R = aW + bV^2$, where a = 0.016 and b = 0.055, W is in N and V is in km/hr. Find out if the vehicle is adequate for the job if the transmission efficiency is 90%. What is the pull in the coupling at this speed? If available power is in top gear by suitably loading the trailer, what is the pull in the coupling at 57.75 km/hr? **(10 Marks)**

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

b. Explain the requirements of a good clutch. **(07 Marks)**

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

3 a. Explain the working of a electromagnetic clutch with figure. **(08 Marks)**

b. List out the clutch troubles and give appropriate reasons. **(06 Marks)**

c. State the advantages and disadvantages of fluid coupling. **(06 Marks)**

4 a. List types of torque converters, explain any one type with figure. **(10 Marks)**

b. Discuss the performance characteristics of torque convertors, with the help of graphs. **(10 Marks)**

PART – B

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

b. With a neat sketch, explain the working of a constant Mesh gear box. **(07 Marks)**

c. A four speed gear box is to be designed for providing the ratios of 1.0, 1.46, 2.28 and 3.93 to 1 as nearly as possible. The diametrical pitch of each gear is 3.25 mm and the smallest pinion is to have atleast 15 teeth. Determine the suitable number of teeth of the different gears and distance between the main shaft and lay shaft. **(10 Marks)**

6 a. Explain the principle of operation of a planetary transmission system with figure. **(10 Marks)**

b. With a neat sketch, explain the construction and working of a overdrive and state the advantages. **(10 Marks)**

7 a. Explain the advantages and limitations of hydrostatic drives. **(10 Marks)**

b. List out different hydrostatic drives, and explain the basic working principle of the same. **(10 Marks)**

8 a. With sketch, explain the working of 'Borg – Warner' automatic transmission. **(10 Marks)**

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

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10AU62

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Automotive Transmission

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Discuss various resistances for propulsion of vehicle. **(07 Marks)**

b. Define:
i) Traction,
ii) Traction effort and
iii) Draw bar pull. **(03 Marks)**

c. A motor car with wheel base 2.75 m with a center of gravity 0.85 m above the ground and 1.15 m behind the front axle has a coefficient of adhesion 0.6 between the tyre and ground. Calculate the maximum possible acceleration when the vehicle is
i) Driven on four wheels.
ii) Driven on the front wheels only
iii) Driven on the rear wheels only **(10 Marks)**

2 a. Single plate friction clutch is to be designed for a TATA truck developing a power of 80.85 KW at 2600 rpm. The maximum torque developed however is 400 Nm at 1750 rpm. A maximum wear of clutch facing of 3 mm is to be allowed, when the clutch is to transmit at least 30%. A pressure intensity of 200 kPa can be safely allowed and ratio of inside diameter to outside diameter is 0.7 is considered reasonable.
i) Calculate clutch plate dimensions.
ii) If 10 springs are used and initial spring force is to be 1.3 times. The spring force after allowable wear of 4 mm, find out the spring stiffness. Assume uniform wear and $\mu = 0.35$. **(10 Marks)**

b. With neat sketch, explain the construction and working of centrifugal clutch. **(10 Marks)**

3 a. Explain with neat sketch the working of fluid coupling. **(10 Marks)**

b. Discuss the term over running clutch. Explain different types of over running clutch with relevant sketches. **(10 Marks)**

4 a. Give a comparison between torque converters and fluid coupling. **(06 Marks)**

b. Explain the typical hydrodynamic transmission system with suitable sketch. Also state the advantages and disadvantages of hydrodynamic transmission. **(14 Marks)**

PART – B

5 a. A four speed gear box is to be constructed for providing the ratios 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 the distance between the main shaft and lay shaft? **(10 Marks)**

b. Explain with neat sketch the construction and working of constant mesh gear box. **(10 Marks)**

6 a. Explain the working of over drive with neat sketch. **(10 Marks)**

b. An epicyclic gear consists of three wheels, A, B and C shown in Fig.Q6(b). Wheel A has 72 internal teeth, wheel C has 32 extremal teeth. The wheel B gears with both A and C and 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.

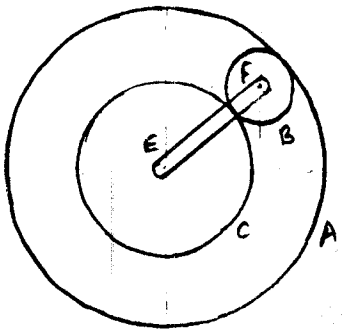

Fig.Q6(b) **(10 Marks)**

7 a. With neat sketch explain the working principle of hydrostatic drive system. **(08 Marks)**

b. Give the comparison between constant displacement pump and variable displacement pump. **(06 Marks)**

c. Discuss about the applications and limitations of hydrostatic drives. **(06 Marks)**

8 a. With a neat sketch, explain the working of Borg-Warner automatic transmission. **(10 Marks)**

b. Explain the layout of electric transmission. Also list out the limitations. **(10 Marks)**

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