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CS/B.Tech-AUE(NEW)/SEM-6/AUE-602/2013

2013

POWER UNITS AND TRANSMISSION

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Double declutching is required in constant mesh gear box

a) to provide the direct grear

b) to equalize the speed of main shaft gear and the sliding dog

c) to equalize the speed of counter shaft gear and the sliding dog

d) none of these.

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ii) In the torque converter, oil leaving the turbine is changed into a helping direction by curved

a) pump vanes

b) turbine vanes

c) stator vanes

d) none of these.

iii) In a fluid coupling the greater the difference between the speed of the driving and driven member

a) the higher the coupling efficiency

b) the lower the turbulence

c) the lower the coupling efficiency

d) none of these.

iv) Clutch chattering or grabbing is noticeable

a) at low speed

b) when engaging the clutch

c) when accelerating

d) during idling.

v) The sun gear in the planetary gear system meshes with the

a) pinion cage

b) ring gear

c) clutch gear

d) planet pinion.

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vi) Which is a type of automatic transmission ?

a) Hydromatic drive

b) Torque converter transmission

c) Both (a) and (b)

d) None of these.

vii) Mean effective radius of contact surfaces of a clutch plate is decided by

a) co-efficient of friction

b) axial pressure

c) space available in the vehicle

d) amount of torque to be transmitted.

viii) If the tractive effort is highest for a given velocity, then the vehicle must be in

a) top gear

b) 1st gear

c) 2nd gear

d) 3rd gear.

ix) The vortex flow is maximum when the slip is

a) 0.5%

b) 5%

c) 20%

d) 100%.

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x) In hydrodynamic drive, power is transmitted due to

a) change in velocity

b) change in pressure

c) change in potential energy

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain the construction and operation of a centrifugal type clutch with neat sketch.

3. A multiplate clutch is to be designed for a motor cycle whose engine develops maximum torque of 13 Nm at 3500 r.p.m. The external diameter of the clutch facing is limited to 100 mm and the inner diameter is assumed to be 0.6 times the external diameter. The maximum intensity of pressure may be taken as 80 kPa and $\mu = 0.3$. Calculate the number of plates.

4. Write a short note on modified Ward-Leonard electric drive.

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5. In a gear box the clutch shaft pinion has 16 teeth and the low gear main shaft pinion has 30 teeth. The pinions which gear with them on the lay shaft have 32 and 18 teeth respectively. The rear axle ratio is 6 to 1 and the overall diameter of the rear tyre is 0.915 m. If the engine r.p.m. is 1500, what is the speed of the vehicle in km/h in low gear ?

6. With a sketch, explain the working of Lock-up Torque converter. What are the flow losses and how are they minimized ? 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Discuss the various types of gear boxes used in an automobile.

   b) What is a synchronizing device ? How does this device help smoothe gear engagement ?

   c) What are the differences between fluid coupling and torque converter ? 5 + 8 + 2

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8. a) Describe Janny hydrosctalit transmission system with a neat sketch.

   b) Explain the necessity of gear box for a vehicle using performance curves analysis. 9 + 6

9. a) A truck has gross vehicle weight of 89026 N. Engine displacement is 10 m^3, power 77.3 kW at governed speed of 2400 r.p.m. Maximum torque 345.8 N-m at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission is 1.605 : 1. Drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Effective wheel diameter is 0.950 m. Frontal area of truck is 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions —

      i) at governed engine speed

      ii) at speed of maximum torque, in the equation

      $R = kW + KaAV^2$

      $K = 0.014$, $Ka = 0.0462$ where V in km/hr.

   b) Differentiate between Multistage and Polyphase torque converters. 10 + 5

10. a) How second gear is obtained in wilson gear box ? Give a neat sketch. Deduce the second gear ratio.

    b) Draw graph for characteristics of a conventional three element converter by using this. Explain the general properties of the hydrodynamic torque converter. 8 + 7

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11. Write short notes on any *three* of the following : 3 × 5

i) Hydraulic control system for automatic transmission

ii) Chevrolet "turbo glide" automatic transmission

iii) Electronic control automatic transmission

iv) Control devices in automatic transmission

v) Fluid coupling.

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