



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (AUE)/SEM-5/AUE-504/2010-11**

**2010-11**

**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) Which transmission unit disengages the drives and provides a smooth take-up of the drive ?

- a) Gearbox
- b) Clutch
- c) Final drive
- d) Differential.

ii) Function of cushion spring in clutch plate is to

- a) Transmit power
- b) Dampen torsional vibration
- c) Torque multiplication
- d) None of these.



- iii) The purpose of double declutching when changing down is to
- a) Slow down the lay shaft
  - b) Speed up the lay shaft
  - c) Slow down the main shaft
  - d) Speed up the main shaft.
- iv) In a simple planetary gear set, the output member to increase torque is always the
- a) Sun gear
  - b) Ring gear
  - c) Planet carrier
  - d) None of these.
- v) Torque ratio available in torque converter is
- a) Zero
  - b) Finite
  - c) Ten
  - d) Infinite.
- vi) The purpose of the fluid coupling is to act as
- a) Synchronizing device
  - b) Automatic gear change
  - c) Flexible power transmitting coupling
  - d) None of these.



vii) Torque converter losses are minimum at

- a) Coupling point
- b) Design point
- c) Max. Speed point
- d) No. Point.

viii) In constant mesh gearbox, type of gear is

- a) Spur gear
- b) Helical gear
- c) Hypoid gear
- d) Helical and spur gear.

ix) The torque converter vanes are usually

- a) Circular
- b) Curved
- c) Radial
- d) Flat.

x) Overrunning clutch is provided

- a) After the engine
- b) Just after the gearbox
- c) Just before the gearbox
- d) After the flywheel.



**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.

3 × 5 = 15

2. A car engine develops 5.9 kW at 2100 r.p.m. Find the suitable size of clutch plate having friction linings riveted on both sides to transmit the power, under the following conditions :

- a) Intensity of pressure on the surface not to exceed  $6.87 \times 10^4$  Pa.
- b) Slip torque and losses due to wear etc. is 35% of engine torque.
- c) Co-efficient of friction on contact surface is 0.3.
- d) Inside diameter of the friction plate is 0.55 times the outside diameter.

( Prove any formula used in finding the clutch plate size ).

3. Describe, how the different gear ratio are obtained in a planetary gear system.



4. a) Define slip with respect to torque converter.
  - b) What are the differences between fluid coupling and torque converter ?
  - c) What is meant by intelligent control ?
5. Describe the working of Chevrolet turboglide transmission.
  6. Discuss about Toyota "ECT-i" transmission.

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Draw a neat sketch of a diaphragm clutch and explain its construction and operation.
- b) In a gearbox the clutch shaft pinion has 14 teeth and low gear main shaft pinion 32 teeth. The corresponding lay shaft pinion have 36 teeth and 18 teeth. The axle ratio is 3.7 : 1 and effective radius of the rear tyre is 35.5 cm. Calculate the car speed in the above arrangement at an engine speed of 2500 r.p.m.  $8 + 7$

CS/B.Tech (AUE)/SEM-5/AUE-504/2010-11



8. Write short notes on any *three* of the following :  $3 \times 5$

- a) Multistage torque converter
- b) Synchromesh gearbox
- c) Polyphase torque converter
- d) Clutch hydraulic actuation system.

9. a) Explain the principle and operation of fluid coupling with sketches.

- b) A automotive gearbox gives three forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3 : 1. The centre distance between the shaft is 110 mm approximately. Gear teeth module 3.25 mm are to be employed.

Sketch the layout of a typical constant mesh gearbox for these conditions giving the number of teeth for the various gear wheels and showing closely how the different ratios are obtained.  $6 + 9$



10. a) What is the principle of electric torque conversion ?
- b) Describe with a neat sketch, the modified Ward-Leonard control system.
- c) What are the advantages and disadvantages of electric drives ? 2 + 10 + 3
11. a) Describe Janny hydrostatic transmission system with a neat sketch.
- b) Explain how second gear is obtained in Wilson gearbox with a neat sketch. Deduce that gear ratio. 8 + 7

