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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018**

COURSE NAME : AUTOMOTIVE DRIVETRAIN
COURSE CODE : BNG 30603
PROGRAMME CODE : BNG
EXAMINATION DATE : JUNE / JULY 2018
DURATION : 2 HOURS AND 30 MINUTES
INSTRUCTION : ANSWERS ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1**
- (a) Explain the **THREE (3)** main functions of the drivetrain. (3 marks)
 - (b) Explain the difference between torque and horsepower with appropriate figures for further explanation of your answer. (4 marks)
 - (c) **Figure Q1(c)** shows the typical torque and horsepower curves. Based on the figure, analyse the horsepower and torque relationship. (3 marks)
 - (d) Explain **THREE (3)** functions of gear in transmission. (6 marks)
 - (e) Identify **TWO (2)** resistances need to overcome for engine and drivetrain to move the vehicle. (4 marks)
- Q2**
- (a) Describe the clutch operation. (4 marks)
 - (b) Identify **THREE (3)** advantages of diaphragm-type clutch compared to others. (6 marks)
 - (c) List **FOUR (4)** basic purposes of flywheels. (4 marks)
 - (d) Demonstrate the clutch pedal free travel test procedure. (6 marks)
- Q3**
- (a) During checking the transmission fluid level and condition, the dirty fluid is observed. Justify your recommendation and procedure required afterward. (10 marks)
 - (b) **Case Study Q3 (b):**
A vehicle equipped with a manual transmission had to be repaired several times for worn shift forks. Even though the vehicle warranty paid for the repair, both the customer and the service department personnel were concerned about the repeated failures. All technical service bulletins (TSBs) were checked to see if there was an updated, improved shift fork. No luck. After the third repair, the service technician rode with the customer to see if the cause could be determined. As the woman driver got into the driver's seat, she placed the handle of her purse over the shifter on the floor and allowed the purse to hang from the shifter. The technician asked the owner if she always placed her purse on the shifter and when she said yes, the technician knew immediately the cause of the worn shift forks.

- (i) Based on **Case Study Q3 (b)**, identified and explain the cause of the worn shift forks. (6 marks)
- (ii) Recommend the solution for this case study. (2 marks)
- (iii) Justify why the service technician take the owner on the test drive to find the root cause of the worn shift forks. (2 marks)

Q4 (a) Case Study Q4 (a):

A Honda Acura (mileage: 85,000 miles) runs good in park and neutral, but the engine dies as soon as it is shifted into gear. Test reveal no problems outside of the transaxle. When the transaxle was removed, the torque converter was found to be blue from overheating and seized up internally. It had also sent metal particles throughout the transaxle

Based on **Case Study Q4 (a)**, determine the customer complaint, interpret the root cause and recommended solution.

(6 marks)

- (b) If the fluid leaves the torque converter when the engine is off, the vehicle will not move when the engine is restarted until the torque converter is refilled by the pump, which causes a delay. The torque converter drain back is suspected.
 - (i) Based on above situation, construct technical procedures to perform torque converter drain back test. (5 marks)
 - (ii) If the torque converter drain back is occurred, verify the root cause and recommend the solution. (4 marks)
- (c) List **FIVE (5)** methods to check torque converter to ensure it is in useable condition when remove the transmission. (5 marks)

Q5 (a) Explain THREE (3) advantages and disadvantages of Continuously Variable Transmission (CVT) compared to conventional automatic transmission. (6 marks)

- (b) Categorized **THREE (3)** types CVT noise issues and identified the recommended solution for each type. (6 marks)



(c) **Case Study Q5 (c):**

The owner of a Subaru Legacy complained that the CVT (TR580) transmission was slow to engage from park to reverse and from drive to reverse. The technician assigned to the vehicle was able to verify that it required as long as four seconds to shift from drive to reverse or from neutral to reverse. After performing a thorough visual inspection, including a fluid level check, and not finding any issues, a scan tool was used to see if there were any transmission related diagnostic trouble codes. There were none so the technician checked for any technical service bulletins (TSBs) and found one (#16-97-15) that did address the customer complaint. In the TSB, there was a procedure to follow to relearn the Transmission Control Module (TCM), which stated that this should be performed if there is a lag time greater than 1.5 seconds.

Based on **Case Study Q5 (c)**, demonstrate the relearn control procedure using gear selector on **Figure Q5(c)**.

(4 marks)

- (d) List **TWO (2)** options for customer when filling or replacing CVT automatic transmission fluid.

(4 marks)

-END OF QUESTIONS -



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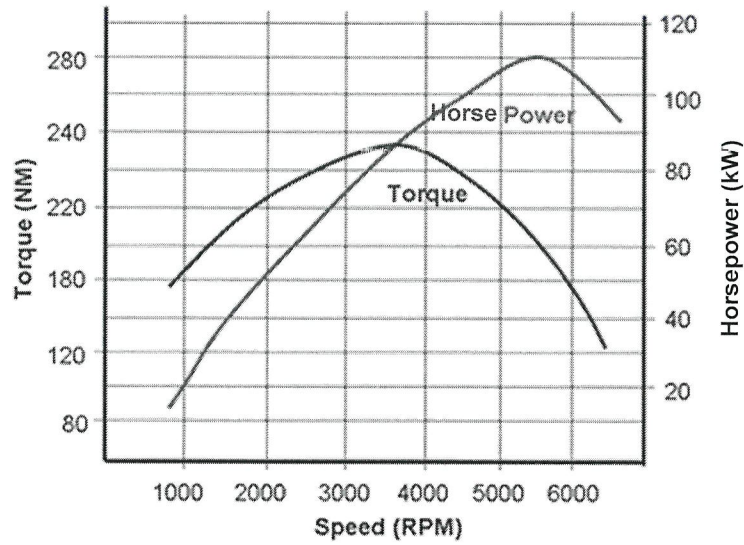


Figure Q1(c)



Figure Q5(c)

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