

Motilal Nehru National Institute of Technology Allahabad, Prayagraj-

Mechanical Engineering Department

Mid Semester (Even) Examination 2019-20: **B. Tech VI Semester**

Course Code: ME 16104 Course Name: **Automobile Engineering**

Branch: Mechanical Engineering - Student Reg. No.: **20173035**

Duration: **90 Minutes**

Max. Marks: 100

1. a) What is a transmission system, Explain with a line diagram. 10
- b) Sketch the schematic arrangement of the following transmission systems: 10
- i) Clutch Gear Box and rear axle as live axle
 - ii) Clutch Gear Box and front axle as live axle
- Give at least two examples of each of the above type of transmission based vehicles available in Indian Market.
2. a) Why a gradual engagement clutch is used in an automobile? Explain the basic principle of operation of a friction clutch. 15
- b) Sketch the arrangement of a single plate clutch and explain it's working? Give at least four examples where single plate clutch is used. 15
3. a) What is a multi plate clutch? Discuss it's application in automotive industry. 10
- b) *Hero Moto motor cycle uses a multi plate wet clutch while Tata Truck in general has single plate dry clutch – why-discuss.* 10
4. a) What is the necessity of a gearbox in an automobile? Why only four forward and one Reverse gear is a common feature in general vehicles while the necessity demands infinite gear ratio? Justify the necessity of infinite gear ratio in an automobile and then mention the practical difficulty in having an infinite gear ratio based gear box? 15

OR

Read Annexure 1 titled "Hyundai's new tech will shift transmission based on road and traffic conditions" and Annexure 2 "Predictive control method and apparatus for vehicle automatic transmission – Google Patent. 15

What ideas come to your mind by reading the articles- present your views.

- b) What are the various resistances a vehicle has to overcome while it is moving on a road? Discuss few simple steps that can lead to reduction in rolling resistance hence energy saving and vehicle performance improvement.
- The rear tyres of a tractor are bigger than even the truck tyres, why so? 15

Annexure 1.

Hyundai's new tech will shift transmission based on road and traffic conditions, February 20, 2020

Hyundai and Kia transmissions are about to get a lot smarter.

This transmission tech knows more than you.

The automatic transmission has one important job: to shift through gears. Whether it's tuned to enhance performance or squeeze every last bit of efficiency from the powertrain is up to engineers, but Hyundai and Kia are taking things a step further.

The brands said on Thursday both have created the predictive Information and Communication Technology (ICT) Connected Shift System. It's a really long name that has a simple mission: make transmission shifts more efficient. The technology relies on 3D navigation maps, cameras and radar to send data collected to software in the transmission control unit.

From there, the control unit analyzes the data in real time to shift gears based on traffic and road condition factors. You're probably wondering what the benefits look like in a real world scenario. Good, because Hyundai and Kia have a perfect example. Say there's a long stretch of road that will make for an extended slow-down period. As the technology analyzes the vehicles ahead and radar doesn't find any changes in speed, the new system will tell the transmission to shift to neutral. While in neutral, the engine won't rev, which is an obvious boost in fuel efficiency.

On winding roads, Hyundai and Kia engineers found the number of transmission shifts dropped 43%, and drivers even relied less on the brakes; brake application fell 11% in testing. But the tech is smart enough to understand when the driver requests power quickly. When merging onto the highway, the ICT automatically flipped the driver profile to a sport mode for quicker shifts. Once merged, the vehicle returned to its standard characteristics for efficiency.

This technology is coming very soon to new Hyundai and Kia vehicles, but there's already room for improvement, they said. In the future, the ICT could communicate with traffic signals to correctly predict a shift pattern while approaching stoplights. That'll require an LTE or 5G connection, so we're not quite there yet.

Ref: <https://www.cnet.com/roadshow/news/hyundai-kia-technology-transmission-road-traffic/>

Annexure 2.

Predictive control method and apparatus for vehicle automatic transmission

Abstract

In a method and apparatus for controlling an automatic transmission in a motor vehicle, a vehicle simulation device uses information regarding current vehicle operating parameters, together with map information regarding a route being traveled by the vehicle to project the dynamic longitudinal behavior of the vehicle, including vehicle velocity for the road that lies ahead. An evaluation module utilizes speed profile information generated in this manner to develop a desired torque. Finally, a shift strategy module converts the desired torque into a desired gear and a point in time for shifting, such that the transmission either shifts into neutral or shifts to an appropriate gear. The invention may be implemented in the form of hardware components, in the form of software modules which are run on either a centralized or distributed vehicle control system, or a combination of hardware and software components.

<https://patents.google.com/patent/US20060293822A1/en>