

FIRST SEMESTER EXAMINATIONS


2017/2018 ACADEMIC SESSION

COURSE: ATE 407 – Modeling, Analysis & Control of Hybrid Electric Vehicles (3 Units)

CLASS: 400 Level Automotive Engineering

TIME ALLOWED: 2 Hours: 30 Min.

INSTRUCTIONS: Answer any **FOUR** questions


HOD'S SIGNATURE

Date: March, 2018

Question 1

(a). Give functions of the labeled parts in Fig. 1.0

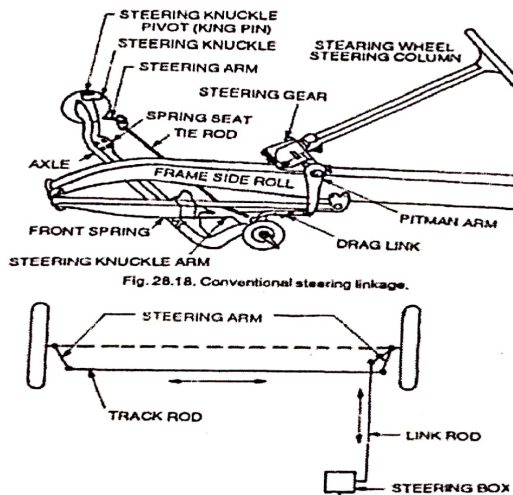


Fig.1.0: Automobile Chassis and its parts

6 marks

(b) Give 5 Functions of Steering System

5 marks

(c) Electric cars are completely silent because there is no internal combustion engine. In fact

they are so quiet that manufacturers are thinking that EVs may one day require some kind of noise device on them to alert pedestrians that they are within the area. Relate this information to internal combustion engine and explain.

4 marks

Question 2

(a) Write short notes on the following:

- i. Turning Radius
- ii. Over Steer
- iii. Under steer
- iv. Turning Radius

8 marks

(b) Why does society need/want hybrid and electric vehicles?

3 marks

(c) What are the functions of suspension systems?

4 marks

Question 3

(a) Explain how the Hybrid Electric Vehicle (Hybrid of Electric and Internal Combustion) operates using the figure 2.0 below as a case study.

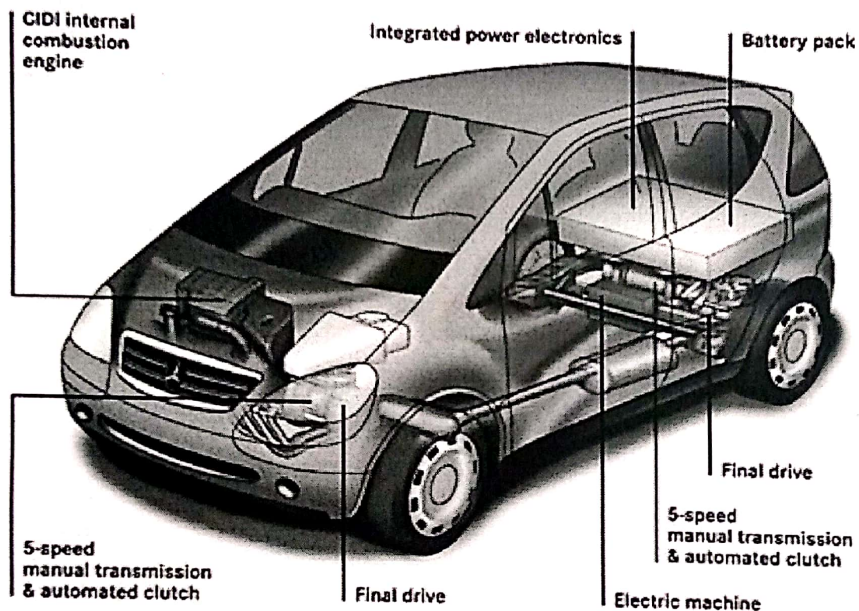


Fig. 2.0

(b) Discuss the two basic types of hybrid electric vehicles: (i) series, and (ii) parallel

6marks

(c) State the advantages of suspension system

4 marks

5 marks

Question 4.

(a). What is brake fade or fading?

3 marks

(b) Mention 2 types of Brakes, and discuss the operational process of any one of them.

4 marks

(c) In relation to question 4b, itemize the advantages of one over the other.

4 marks

(d) State the disadvantages of the same one mentioned above, over the other 4 marks

Question 5.

(a) what are the main components of Chassis?

4 marks

(b) State the requirements of bodies for various types of vehicle

4 marks

(c) Categorize the vehicles below in Fig.3.0 into the kind of Chassis design according to the body usage.

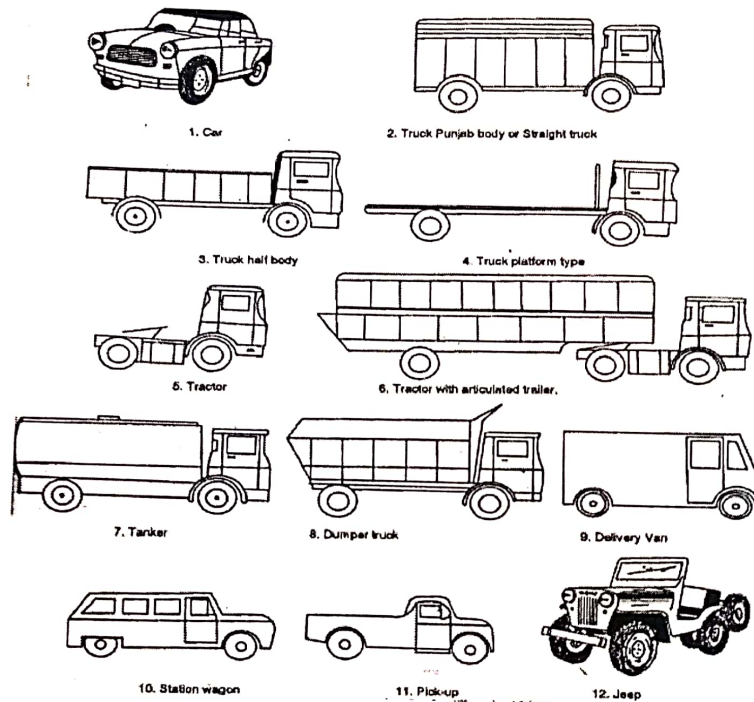


Fig.3.0

7 marks

Question 6.

(a) What are the benefits of Electric Vehicle and Hybrid Electric Vehicle compared with conventional vehicles

5marks

(b) What is the benefit of the Nickel Metal hydride battery over other types of batteries?

4 marks

(c) Define and discuss the relationship between the following:

- i. inverter
- ii. motor

3 marks

3 marks