

Department of Mechanical Engineering
Chittagong University of Engineering and Technology (CUET)
Level 4, Term-II, Examination 2025

Course: ME 415	Full Marks: 210	Time: 3 hours
Course Title: Automobile Engineering	Date: 02/06/2025	

The figures of the right margin indicate full marks. The questions are of equal values. There are 64 questions in each section. Answer any 05 questions from each part. Use separate script for each system.

Section – A

- Q.1(a) Differentiate between constant mesh gear box over sliding mesh gear box. 06
 (b) Explain working principle of differential with neat sketch. 12
 (c) What is torque converter? What are the differences between torque converter and fluid coupling? Explain briefly. 10
 (d) What do you understand by overdrives? When to use or curves? 07
- Q.2(a) What is steering system in automobile? What are the requirements of a good steering system? 08
 (b) What are the effects of using tubeless tires in your car? 08
 (c) What are the effects of wheel alignment on vehicle safety? Explain briefly. 10
 (d) Explain the working of the disc brake. 09
- Q.3(a) What is ignition system in automobile engine? State the working of battery ignition system. 12
 (a) What is ignition timing and firing order? What are the effects of firing order? 08
 (c) What do you understand by ECU? How ECU control the fuel injection system? 15
- Q.4(a) List five sensors commonly used in automobiles and describe their functions. 08
 (b) What is CNG? Explain the procedure of CNG conduction. 05
 (c) Why the ignition timing needs to be more advanced for CNG than as for gasoline? 07
 (d) Write short notes on Advanced Driver Assistant Systems. 05

Section – B

- Q.5(a) Describe various resistances on the motion of the vehicle. 10
 (b) What is the different classification of shocks used in automobiles? Explain. 10
 (c) A 2500 lb car is driven at maximum speed of 90 mph on level paved surface at sea level. The car has drag coefficient $C_d = 0.38$ and 20 ft² frontal area. Air density at sea level is 0.002378 slug/ft³. What is the horsepower expended at this maximum speed? 15
- Q.6(a) What do you understand by suspension system? What are the different types existing on suspension system? State the working of shock absorber. 10
 (b) Why sway bar is used in vehicle? Explain the function of sway bar with proper figure. 10
 (c) What do you mean by tubeless tire and tube tire? What are the advantages of tubeless tire over tube tire? Explain briefly. 15
- Q.7(a) What is electric car? What are the advantages and disadvantages of electric car? Explain briefly. 13
 (b) Describe engine cooling system. Which cooling system is best for your car? Explain. 12
 (c) What are the importance of exhaust system? Describe various parts of exhaust system with proper diagram. 15
- Q.8(a) What are the main components of engine starting system? Briefly explain the engine starting system with proper diagram. 13
 (b) What are battery charging methods? What is CCA? 10
 (c) What are the top five signs of engine trouble? Explain briefly. 10

***** The End *****

Department of Mechanical Engineering
Chittagong University of Engineering and Technology (CUET)
Level 4, Term-II, Examination 2022

Course: ME 415	Full Marks: 210	Time: 3 hours
Course Title: Automobile Engineering	Date: 26/02/2024	

The figures in the right margin indicate full marks. The questions are of equal value. There are 04 questions in each section. Answer any 03 questions from each section. Use separate script for each section.

Section – A

- Q.1 (a) What is clutch? What are the functions of automobile clutch? Discuss any two types of clutch used in automobile? 10
- (b) Differentiate among manual, semi-automatic, and automatic transmission system. 07
- (c) State working of automatic transmission system. 08
- (d) Why differential is used in automobile? Show the working principle of differential with proper schematic diagram. 10
- Q.2 (a) Explain the working principle of power steering system of an automobile with neat sketch. 12
- (b) What are the effects of incorrect wheel alignment on vehicle performance? 08
- (c) What do you mean by Anti-lock Braking System (ABS)? How ABS solenoid work? 15
- Q.3 (a) What is ignition system in automobile engine? State working of magneto ignition system. 10
- (b) What do you understand by ECU? How fuel injection system work? Draw the diagram of PFI system. 15
- (c) Write short notes on; (i) Fluid coupling (ii) Overdrive 10
- Q.4 (a) What are the most common pollutants from car exhaust gas? How their pollution are controlled? 10
- (b) Why the ignition timing needs to be more advanced for CNG than as for gasoline? 05
- (c) Discuss CNG conversions kits. How diesel engine can be operated by CNG? 12
- (d) Write five first auto-motive technology in 2023 in details. 08

Section – B

- Q.5 (a) What are the functions of chassis frame? Explain briefly. 10
- (b) What do you understand by tractive effort and resistance? What are the factors influence aerodynamic resistance of vehicle? 12
- (c) A vehicle having a mass of 750 kg travelling at speed 50 km/h up a gradient 1 in 10. The car has drag co-efficient $C_d = 0.35$ and 0.75 m^2 frontal area. The air density is 1.2 kg m^{-3} and the co-efficient of the rolling resistance is 0.02. What is the total resistance of motion of the vehicle? 13
- 912.38 N*
- Q.6 (a) What are the functions of suspension system? How does the coil suspension system work? 12
- (b) What is the meaning of 15x6 - JJ 114.3 - 4 - 33 wheel? Explain each term with proper figure. 10
- (c) What are the differences between bias and radial tire? Explain briefly. 13
- Q.7 (a) What is engine layout? Explain various types of engine layout with proper sketch. 12
- (b) Why do some engines use a dry sump oil lubrication system? 10
- (c) How hybrid and electric vehicles are differentiated over conventional vehicle? 13
- Q.8 (a) What is Hendrix drive? Briefly explain the engine starting system with proper diagram. 15
- (b) Why battery is used in automobile? Show the charging and discharging process of lead-acid battery. 10
- (c) If your car fails to start, what are the essential things to check? 10

****End****

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*Better control
via temp
sensors*

Department of Mechanical Engineering
Chittagong University of Engineering and Technology (C U E T)
Level 4, Term II Examination 2021

Course No: ME 415	Full Marks: 210	Time: 03 hours
Course Title: Automobile Engineering	Date: 05 / 02 / 2023	

The figures in the right margin indicate full marks. The questions are of equal value. There are 04 questions in each section. Answer any 03 questions from each section. Use separate script for each section.

Section: A

Marks

1. a) Classify the motor vehicles in various way. Also list the main components of an Automobile. 12
- b) Explain tractive resistance and tractive effort. What are the factors affecting rolling resistance? 13
- c) The co-efficient of rolling resistance for a truck weighting 7000 kg is 0.02 and co-efficient of air resistance is 0.002. The frontal of truck is 4.98 m². How much is the total resistance of the vehicle if the maximum speed is 80 km/hr? 10

2. a) What factors act on a suspension system? Explain how suspension system works. Why coil spring suspension used in cars and leaf springs in bus? 15
- b) What is a sway bar. Why it is used? 5
- c) How to read the wheel markings? 5
- d) What are the differences between bias and radial tire? 10

3. a) What do you understand by engine layout. Explain different types of engine layout with relevant sketch. 13
- b) Distinguish among normal fuel driven along with hybrid car and electric car. 12
- c) What is lubricating system? Why it is used? What is the meaning of SAE20W-40 engine oil? 10

4. a) Why clutch is used to change gears? How do you explain the change of gears due to resistance? 10
- b) In modern automobiles synchromesh gear box is preferred over constant mesh gear box. Justify its application with suitable sketch. 10
- c) Write short notes on (i) Epicyclic gear box, (ii) Torque converter, and (iii) Differential Mechanism. 15

Section: B

5. a) What is the meaning of the letters by the gear selector lever in a car, such as P, R, N, D and S? 8
- b) What do you understand by bleeding of a brake? Write the mechanism or way to stop an automatic transmission car, when brake would be failed. 12
- c) What are the major differences between dc generator and alternator? 8
- d) A car of mass 1000 kg is travelling at 45 kmph. Determine (i) the kinetic energy it possess, and (ii) the braking efficiency of a vehicle if the brakes bring the vehicle to rest from 60 kmph in a distance 12 meters. 7

6. a) Describe commonly used rating system of storage of battery. 10
- b) Draw and explain the schematic diagram of electronic ignition system. 15
- c) What is firing order and ignition timing? Describe the 4-stroke, 4-cylinder firing order of the engine? 10

7. a) Explain the working principle of power steering system of an automobile with neat sketch. 13
- b) What is meant by exhaust gas emission and exhaust gas pollution? How automobile contribute in global warming in terms of combustion phenomena of an automobile? 12
- c) Why anti-freeze is used with a coolant? Write the necessary measures that need to be followed before starting of a car in winter season. 10

8. a) Write down the seven latest technologies in automobile industry in 2022. 8
- b) What is dual fuel system? Describe CNG conversion kits. 12
- c) Write down 3 advantages of CNG over petrol. How CNG is produced? 15

*****END OF QUESTION*****

Department of Mechanical Engineering
Chittagong University of Engineering and Technology (C U E T)
Level 4, Term II Examination 2020

Course No: ME-415	Full Marks: 210	Time: 03 hours
Course Title: Automobile Engineering	Date: 17/04/2022	

The figures in the right margin indicate full marks. The questions are of equal value. There are 04 questions in each section. Answer any 03 questions from each section. Use separate script for each section.

Section: A

- | | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1. a) What do you understand by automobile chassis? What are the main components of chassis? Differentiate between chassis and automobile body. | 13 |
| b) What is automobile frame? What are the functions of automobile frame? | 10 |
| c) The co-efficient of rolling resistance for a truck weighing 8000 kg is 0.02 and co-efficient for air resistance is 0.002. The area of the truck is 5.67 m ² . How much is the total resistance of the vehicle if the maximum speed is 75 km/hr? | 12 |
| 2. a) Describe and state the reason to use various materials in engine construction parts.
(i) Engine Block (ii) Cylinder Liner (iii) Valve | 15 |
| b) What are the comparative advantages of different types of cylinder liners used in automobile engine? Explain. | 10 |
| c) What is catalytic converter? How does it help in controlling pollutant in the exhaust emission of a car? | 10 |
| 3. a) Describe commonly used rating systems of storage of battery. | 07 |
| b) Describe the chemical action that takes place in a lead acid battery charging and discharging. | 10 |
| c) How starting motor works? Explain with required circuit. | 18 |
| 4. a) Draw the total resistance curve to vehicle in motion and explain how does gear change occur? | 15 |
| b) What is clutch? What are the functions of clutch? Describe the requirement of good clutch in automobile. | 10 |
| c) What is difference between an automobile transmission and a manual transmission? What are the purposes of an automatic transmission? | 10 |

Section: B

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 5. a) What are the advantages and disadvantages of hydraulic brake over mechanical brake? Discuss working principle of hydraulic brake with figure. | 15 |
| b) What is braking system? A Maruti Car moving at 80 kmph takes 32m to stop when the brakes are applied on it under standard test conditions. How much is its braking efficiency? Also determine the retardation produced during braking. | 10 |
| c) Why permanent speed reduction is necessary in automobile at final drive? | 05 |
| d) What do you mean by over drive, under drive and slip angle? | 05 |
| 6. a) Draw and explain the schematic of electronic ignition system. | 12 |
| b) What are the fundamental difference between Carburetor and EFI system? How EFI system works? Explain. | 13 |
| c) What do you understand by ECU? What are the different types of sensor used in automobile car? | 10 |
| 7. a) What are the advantages of tubeless tyre? What is static and dynamic unbalance of a tyre? | 10 |
| b) What are the main causes of tire wear? Explain the effects of inflation pressure on tire wear. | 12 |
| c) Explain the working principle of power steering system with neat sketch. | 13 |
| 8. a) State top five signs of engine trouble and state why these troubles happen. | 08 |
| b) Describe the CNG production with neat sketch. | 15 |
| c) Can a diesel car be converted into a CNG car? Justify your answer with possible explanation. | 12 |

*****END OF QUESTION*****

Department of Mechanical Engineering
Chittagong University of Engineering & Technology (CUET)
Level 4, Term II Examination 2018

Course No: ME 415	Full Marks: 210	Time: 03 hours
Course Title: Automobile Engineering	Date: 13/06/2019	

The figures in the right margin indicate full marks. The questions are of equal value. There are 04 questions in each section. Answer any 03 questions from each section. Use separate script for each section.

Marks

Section: A

1. a) What is an automobile? How automobile are classified? What are the main components of automobile chassis? 12
 b) Describe the various resistance on the motion of automobile. 11
 c) The coefficient of rolling resistance for a truck weighing 6500 kg is 0.01 and coefficient of air resistance is 0.0025. The frontal area of the truck is 5.57 m². How much is the total resistance of the vehicle if the maximum speed is 88 km/h? 12
645.07
2. a) What is suspension system? How does the suspension system work? Why coil spring used in cars and leaf springs used in bus? 13
 b) Briefly describe the tyre classification. What is the difference between Bias and Radial tyre? 12
 c) What are the effects of tyre pressure in automobile? Explain. 10
3. a) Describe and state the reason to use various materials in engine construction parts: i) Cylinder head and ii) Crank case 12
 b) What is the name of the device fitted to car exhausts to reduce pollution? How it is worked? 11
 c) Why lubricating system is necessary? Describe the dry sump lubricating system, 12
4. a) A four cylinder 4-stroke diesel engine has a bore of 10.5 cm, stroke of 12.7 cm and develops 63 b.h.p at 1800 rpm. During a test lasting 15 minutes at 1800 rpm, 2.78 kg of fuel of calorific value 10,900 kCal/kg was used. The air-fuel ratio for chemically correct combustion is 14.8 and the volumetric efficiency referred to air conditions of specific volume 0.805 m³/kg is 80%. Determine the brake thermal efficiency and the percent of available air used for combustion. 20
 b) Describe the requirement of good clutch in automobile. 15
32.93%

Section: B

5. a) 'At the time of cranking the transmission must be placed in neutral'-why? 08
 b) How synchromesh gearbox works? What is the advantage of synchromesh gearbox? 12
 c) Write short note on: i) Torque converter ii) Differential mechanism and iii) Epicyclic gearbox 15
6. a) What is steering geometry and wheel alignment? 08
 b) What is braking system? How Anti-lock braking system (ABS) works? 10
 c) A car of mass 800 kg is travelling at 36 Kmph. Determine i) The kinetic energy it possesses and ii) The braking efficiency of a vehicle if the brakes bring the vehicle to rest from 60 Kmph in a distance of 15 meters. 10
60000 J
- d) What is firing order? Describe the 4-cylinder (inline), 4 stroke firing order of the engine. 07
7. a) If the car won't start what are the basic things need to be checked? 10
 b) State top five signs of engine trouble and state why these troubles happen? 10
 c) What is ignition system in automobile? Describe point type ignition system with neat sketch. 15
8. a) Describe the EFI electronics and sensor diagram. 12
 b) Describe the CNG production with neat sketch. 10
 c) Write short note on: i) TCU and ii) ECU 13