

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

Department of Mechanical Engineering

B. Sc. Engineering 4th Year 2nd Term (Backlog) Examination, 2019

ME 4015

(Automobile Engineering)

Time: 3 Hours

Total Marks: 210

**N.B.:** i) Answer any THREE questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

iii) Assume reasonable data if any missing.

**SECTION-A**

- |      |   |    |
|------|---|----|
| 1(a) | What is meant by automobile? Briefly describe all the main components of an automobile.   | 12 |
| 1(b) | How would you classify automobile engine? Draw a piston and piston rings of an IC engine.   | 12 |
| 1(c) | Why firing order in SI engine is not done serially? Write down the firing order of a six-cylinder V type engine.                              | 06 |
| 1(d) | Why timing belt is used in an automobile engine?  | 05 |
|      |   |    |
| 2(a) | What are the different circuits of a carburetor? With neat sketch describe the operation of accelerator-pump system.                          | 13 |
| 2(b) | Why rich mixture is necessary during starting period of an engine?  | 07 |
| 2(c) | Mention the purpose of fuel pump. Explain how it works.   | 10 |
| 2(d) | Write down the advantages of turbo-charger.   | 05 |
|      |   |    |
| 3(a) | What are the various methods of engine cooling? Explain the water cooling system mentioning the functions of its parts with necessary sketch. | 15 |
| 3(b) | What are the basic purposes of antifreeze in the cooling system?  | 06 |
| 3(c) | What are the causes of excessive oil consumption in IC engine?  | 06 |
| 3(d) | Explain the service rating of lubricant for automobile engine.  | 08 |
|      |   |    |
| 4(a) | Define 'Ampere-hour rating' and 'Sulfation' for a battery. How storage battery specified?   | 08 |
| 4(b) | Why battery charging is necessary? Describe the construction of a lead acid battery with neat sketch.   | 12 |
| 4(c) | What are the functions of electrical system in an automobile? Draw a schematic diagram of automobile electrical system.                       | 10 |
| 4(d) | Explain the advantages of using alternator over dynamo.   | 05 |

## SECTION-B

- 5(a) Why clutch is used in automobile? Explain the functions of: 12  
(i) Friction plate, (ii) Torsion spring, (iii) Cushion spring.
- 5(b) Describe the working principle of a differential gearbox with neat sketch. 10
- 5(c) Why synchronization is necessary for shifting gear? Describe how it works. 08
- 5(d) Show the construction of a muffler with a diagram and label it. 05
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- 6(a) Why torque converter is used in automatic transmission vehicle? Describe the 12  
operating principle of a planetary gear transmission with neat sketch.
- 6(b) Why slip joint is used in propeller shaft? How CV joint operate? 06
- 6(c) Why power brake is used? Describe the operating principle of a hydraulic brake 10  
system used in automobile.
- 6(d) What are the requirements of brake fluid? What are its constituents? 07
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- 7(a) Define Camber, Castor, Toe-in and Toe-out. 08
- 7(b) Explain the working principle of steering system of an automobile with neat sketch. 10
- 7(c) How the tires of an automobile are designated? Differentiate between bias and 08  
radial plies tire.
- 7(d) What is meant by tire wear? Explain the causes and remedies of excessive wear of 09  
tire of automobile.
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- 8(a) Why shock absorber is used in suspension system? Describe the operation of a 10  
simple shock absorber with neat sketch.
- 8(b) What is meant by pollution control system of IC engine? Describe the pollution 13  
control system by catalytic converter and positive crankcase ventilation.
- 8(c) Explain the necessity of heating, ventilation and air-conditioning system in an 07  
automobile.
- 8(d) Write a short note on modern hybrid car. 05