MVM – Knowledge of Materials and Automotive Technology

T070

Wednesday, 16/11/2016

08:30 – 11:30

WORKFORCE DEVELOPMENT AUTHORITY

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ADVANCED LEVEL NATIONAL EXAMINATIONS, 2016, TECHNICAL AND PROFESSIONAL STUDIES

EXAM TITLE: **Knowledge of Materials and Automotive Technology**

OPTION: **Motor Vehicle Mechanics (MVM)**

DURATION: **3hours**

INSTRUCTIONS:

The paper is composed of **three (3) main Sections** as follows:

Section I: Fifteen (15) compulsory questions.	**55 marks**
Section II: Attempt **any three (3)** out of five questions.	**30 marks**
Section III: Attempt **any one (1)** out of three questions.	**15 marks**

Note:

Every candidate is required to carefully comply with the above instructions. Penalty measures will be applied on their strict consideration.

Section I. Fifteen (15) Compulsory questions **55marks**

01. Give an advantage of cylinder sleeves. **1mark**

02. Identify two (2) common types of valve guide used in thermal engine. **2marks**

03. What is the function of the Relief valve (By-pass valve) in the lubricating system? **4marks**

04. Explain briefly the function of the Valve seal. **2marks**

05. What could be happen if a thermostat is not opening when the coolant reach a recommended opening temperature? **1mark**

06. a) What is the melting temperature of grey cast iron? **1mark**

b) A steel rod is subjected to a tensile force of 4.5 kN. If a diameter of the rod is 12.8mm, calculate the stress induced in the rod. **2marks**

07. What are the classifications of engine according to the arrangement of valves and camshafts? **6marks**

08. What are the functions of the connecting rod? **3marks**

09. Give the advantages of common rail injection system. **5marks**

10. List four (4) methods for checking injector. **2marks**

11. What are the functions of the following components of air conditioning system? **3marks**

(a) Evaporator

(b) Condenser

(c) A/C Air compressor

12. Give the comparison between diesel common rail and diesel injection pump. **6marks**

13. Give the advantages of common rail injection system. **5marks**

14. List and explain the four (4) kinds of vehicles emissions. **6marks**

15. List and explain the six (6) basic parts of a turbocharger. **6marks**

Section II. Choose and Answer any three (3) among the following questions.

30marks

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16. Name ten (10) properties of cast iron. **10marks**

17. **a)** What are two (2) causes of loss of coolant on the inside of an engine?

b) In many cases it is even for a specialist impossible to see whether the head gasket is leaking. Give eight (8) possible causes of a defective head gasket.

10marks

18. Draw a sketch of "pintaux nozzle" (Pintle with auxiliary hole) and discuss its merits and demerits. **10marks**

19. A delivery valve can be found in the connecting pieces of the pressure lines.

a) What are the tasks can be performed by the delivery valve of an injector pump?

b) Explain the working of this delivery valve. **10marks**

20. Explain the procedure of relining (replacement) wheel drum brakes. **10marks**

Section III. Choose and Answer any one (1) among the following questions.

15marks

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21. **(a)**Give five (5) objectives that should fulfill consistently and precisely a good injection system for a CI engine.

(b) In order to achieve these objectives, what are five (5) main components required for an ideal injection system and explain the rule of each component

15marks

22. **(a)** Compute the air flow, fuel flow, specific fuel and air consumption for a four-stroke engine developing 2500 kW at 2000 rpm when the stroke volume is 0.07 m^3, η=0.30 and F/A=Fc/A

(b) Compute the indicated and brake mean effective pressure when the mechanical efficiency is 0.8

(c) What would be the brake power developed when the efficiency is 0.25, air flow rate 195 kg/min and F/A=0.9 Fc/A. **15marks**

23. **a)** In order to obtain a better analysis of the actual working cycles, it is essential that we consider the physical properties of the actual working fluid before and after combustion. List ten (10) assumptions made in the analysis of fuel-air cycles.

b) Define scavenging in two stroke engine and list the assumptions made in the two scavenging models. **15marks**