NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

AES & ATC – Automotive engine and auxiliaries systems

T159

Tuesday, 23/07/2024
08:30 – 11:30 AM

Names:.....

Index number:.....

TSS NATIONAL EXAMINATIONS, LEVEL 5, 2023-2024

QUESTIONS and ANSWERS BOOKLET

OPTIONS/ TRADES: AUTO ELECTRICITY AND ELECTRONICS SYSTEM & AUTOMOBILE TRANSMISSION AND CONTROL SYSTEMS TECHNOLOGY

SUBJECT/EXAM: AUTOMOTIVE ENGINE AND AUXILIARIES SYSTEMS

DURATION: 3 Hours

Read carefully the instructions on page 1 & 2.

TOTAL MARKS...../100

FOR EXAMINER'S USE ONLY

QUESTIONS	1	2	3	4	5	6	7	8	9	10	Total
Marks											
QUESTIONS	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**Total**
Marks											
QUESTIONS	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**Total**
Marks											

TSS NATIONAL EXAMINATIONS, LEVEL 5, 2023-2024

INSTRUCTIONS TO CANDIDATES (ANSWER BOOKLET)

1. A candidate should fill in the actual names and the Index number on the cover of this questions and answer booklet on the provided place.

2. It is illegal for a candidate to write any of names, Index number or school name inside the answer booklet.

3. No candidate should remove or tear any pages or part of it in the answer booklet.

4. A candidate should answer in the language in which the examination is set.

5. A candidate should sign on the sitting plan when submitting the answer booklet. He/she has also to check if the answer booklet is well sealed.

6. No extra paper is allowed in the examinations room. If a candidate is caught with it his/her results will be nullified.

7. No candidate is allowed to write answers not related to the subject being sat for, otherwise it will be considered as a cheating case.

8. Write your answers on the 16 lined pages (From page 7 to page 22).

9. Use the last non-lined pages as draft.

10. Results for any candidate who is caught in examination malpractices are nullified. The cheating can be recognized during examinations administration, marking exercise or even thereafter.

N.B: 1) After results publication, there is no remarking and no candidate is given his/her answer booklet for review. This answer booklet is a property of NESA.

2) Claims are only received online within 30 days after results publication. A link will be provided after results publication.

T 159_ Automotive engine and auxiliaries systems

TSS NATIONAL EXAMINATIONS, LEVEL 5, 2023-2024

OPTIONS/TRADES: AUTO ELECTRICITY AND ELECTRONICS SYSTEM & AUTOMOBILE TRANSMISSION AND CONTROL SYSTEMS TECHNOLOGY

SUBJECT/EXAM: AUTOMOTIVE ENGINE AND AUXILIARIES SYSTEMS

DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES (QUESTION PAPER)

This Exam paper is composed of Three Sections (A, B, and C). Follow the instructions given below, and answer the indicated questions for a total of 100 marks

Section **A**: Fourteen (**14**) questions, all **Compulsory**	**55 marks**
Section **B**: Among the five (**5**) questions, attempt any three (3)	**30 marks**
Section **C**: Among the two (**2**) questions, attempt any one (1)	**15 marks**

Allowed materials:

- Ruler
- Blue or black pen
- Calculator

Note:

Every candidate is required to carefully comply with the provided assessment instructions.

T 159_ Automotive engine and auxiliaries systems

SECTION A: Attempt all questions **(55 marks)**

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01. Identify the three (3) types of lubrication system. **(5 marks)**

02. List four (4) functions of engine coolant. **(4 marks)**

03. Write down the five (5) possible checks that should be done on the air intake system. **(5 marks)**

04. Explain the following terminologies: **(4 marks)**

a) Ignition delay.

b) injection point

05. Identify the functions of the following: **(5 marks)**

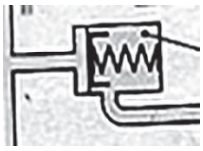
a) crank shaft

b) Connecting rod

06. List four (4) exhaust system components. **(4 marks)**

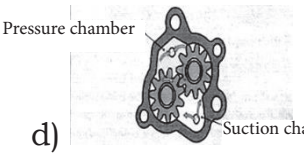
07. Compare catalyst and catalytic converter used in exhaust system. **(4 marks)**

08. What are the names of the following components? **(4 marks)**

a) 

b) 

c) 

d) 

09. Define the following terms used in lubrication system: **(5 marks)**

a) Lubricity

b) Viscosity

c) Pour point

d) Oxidation

e) Flash point

10. What is the difference between tools and materials used in cooling system? **(3 marks)**

11. List down four (4) cooling system components which need to be replaced when engine is overheated. **(4 marks)**

12. What is the function of fuel pump in fuel supply system? **(2 marks)**

13. Match the functions written in column A with their fuel supply system parts in column B. **(3 marks)**

Functions	**Parts of fuel supply system**
a) Stores fuel **b)** Cleans the fuel **c)** Supplies fuel to injection pump **d)** Times, measures, and delivers fuel under pressure to injection nozzles **e)** Atomizes and distributes fuel evenly into. **f)** Performs functions of both the injection pump and nozzle as one unit.	1. Fuel filter 2. Fuel injection nozzle 3. Fuel injection pumps sure at low pressure. 4. Fuel tank 5. Fuel transfer pump 6. Unit injector combustion chamber 7. Remove precipitant that contain in the fuel

14. Match the stages of filtration in column A with their types of filters in column B. **(3 marks)**

Stages of filtration	Types of filters
a) First stage **b)** Second stage **c)** Third stage	1. Secondary filter 2. Primary filter 3. Filter screen TEST DF-35

Section B: Attempt any three (3) questions **(30 marks)**

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15. a) Differentiates diesel engine from petrol engine using their characteristics (do not exceed five). **(10 marks)**

b) List down the five (5) advantages of petrol injection system compared to carburetor system.

16. Read carefully the statements below and choose correct answer. **(10 marks)**

a) Technician A says that in going to high altitudes, engines produce lower power. Technician B says that most engine control systems can compensate the air-fuel mixture for changes in altitude. Which technician is correct?
i. Technician A only
ii. Technician B only
iii. Both Technicians A and B
iv. Neither Technician A nor B

b) A high percentage of oxygen may mean …….
i. Too little fuel is entering the engine
ii. Lambda is greater than 1
iii. The mixture is too lean
iv. All of the above

c) All of these are advantages of electronically controlled fuel injection over mechanical injection systems EXCEPT:
i. continuous air fuel adjustments are possible.
ii. fuel can be delivered in a continuous stream.
iii. reduced emissions are achieved
iv. reduced fuel consumption is achieved.

d) Sequential injection means injection occurs in the sequence of the firing order.
i. Yes
ii. no

e) Which of the following is NOT one of the three basic EFI systems?
i. Throttle body injection
ii. Multipoint fuel injection
iii. Computer-controlled carburetor injection
iv. Gasoline direct injection

17. Wet sump used in lubrication system offers more advantages than dry sump. Justify this statement with ten key points. **(10 marks)**

18. Compare inline injection pump to rotary injection pumps used on diesel engine. **(10 marks)**

19. With help of sketch, explain the working principle of feed pump/primer pump in the following conditions. **(10 marks)**

a) Intermediate stroke

b) Delivery and intake stroke

Section C: Attempt only one (1) question **(15 marks)**

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20. By using the following components: **(15 marks)**
fuel tank, fuel filter, injection pump. Draw a diesel inline injection pump and label the names of each component.
NB: You are supposed to add other necessary components not mentioned above.

21. Write a report detailing all steps followed by a car repair technician in GMSM garage ltd, when dismantling an inline injection pump from a motor vehicle. **(15 marks)**

END OF ASSESSMENT

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