ADVANCED LEVEL NATIONAL EXAMINATIONS, 2015,
TECHNICAL AND PROFESSIONAL TRADES

EXAM TITLE: Automotive Electricity and Electronics

OPTION: Motor Vehicle Mechanics (MVM)

DURATION: 3 hours

INSTRUCTIONS:

The paper is composed of three (3) Sections:

Section I: Fifteen (15) questions, all Compulsory. 55marks

Section II: Five (5) questions, Choose Three (3) only. 30marks

Section III: Three (3) questions, Choose only One (1). 15marks

Every candidate is required to strictly obey the above instructions. Punishment measures will be applied to anyone who ignores these instructions.
Section I. Fifteen (15) Compulsory questions. 55 marks

01. Define the following terms:
   (a) Voltage;  (b) Current;  (c) Resistance 3 marks

02. Calculate the capacity of battery of 24V if its discharging time is 48hrs and load of 120W. 4 marks

03. Describe the two (2) types of “electricity”. Mention the corresponding sketches. 4 marks

04. What are two (2) types of multimeter? 2 marks

05. List four (4) kinds of diodes and their symbols. 4 marks

06. Give two (2) parts of coil. 2 marks

07. List only five (5) steps for adjusting an alternator tension belt. 5 marks

08. List five (5) methods for checking ignition system. 5 marks

09. List three (3) advantages to high-intensity discharge bulbs. 3 marks

10. The voltages measured across three resistors connected in series are 5 V, 7 V and 10 V, and the supply current is 2 A. Determine:
   (a) the supply voltage, 5 marks
   (b) the total circuit resistance and
   (c) the values of the three resistors.

11. Why is a reduction starting motor sometimes used? 2 marks

12. Resistors of 20Ω, 20Ω and 30Ω are connected in parallel. What resistance must be added in series with the combination to obtain a total resistance of 10Ω, if the complete circuit expends a power of 0.36 kW, find the total current flowing. 4 marks

13. List two (2) functions of a starter solenoid. 2 marks

14. List five (5) targets of modern engine techniques. 5 marks

15. Give two (2) types of transistors and their symbols. 5 marks

Section II. Answer any three (3) questions of your choice
(Do not choose more than three questions). 30 marks

16. (a) Today’s Vehicle uses computers to control and monitor all major system while the human nervous system uses chemical-electrical to control the body. State the comparison between human nervous system and the automobile computer system. 10 marks

(b) State four (4) types of computers found on a vehicle.
17. a) In lighting system most late-model vehicles use multifunction switches to control several circuits including headlamps system. Explain the possible causes and remedies of dimmed headlamps while engine is off or idling.

b) List the different steps of maintenance of a stator battery. 

10marks

18. During starting operation, starter can fail to engage or present noise. Discuss the different sources of excessive noise and how to solve these troubles?

10marks

19. a) Design and explain a diagram showing working states regions of a diode.

b) Explain the phenomena of charges concerning two bodies rubbed together.

10marks

20. Different symptoms on ignition can be produced by faulty system components. Explain the causes and correction of weak spark at all road of the engine.

10marks

Section III. Answer any one (1) question of your choice
(Do not choose more than one question). 15marks

21. a) Several techniques can be done when verifying engine performance. Discuss the different checks carried out while analyzing a square and Sine wave Signals using scan tool.

b) Enumerate different steps followed during jump start operation.

c) List different types of diodes using symbols.

15marks

22. a) Which specialty is presented by brushless motor compound compared with mechanically commutated motors?

b) Design a chart showing different steps followed to ensure further diagnosis for any trouble of electrical and electronic system.

15marks

23. a) With diagram explain the operating principle of rectification of waves by diodes using dual pulse switching.

b) The current intensity of (15A) flows in a wire of 0.5Ω during one hour (1h). Calculate the quantity of heat transferred in 1h. Hence express the answers in Joule, Calories and Kilocalories.

c) Find the causes of failure of the following trouble: contact breaker too small.

15marks