

**MVM – Automotive Electricity
and Electronics**

T084

Friday, 23/11/2018

08:30 – 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY



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**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2018,
TECHNICAL AND PROFESSIONAL STUDIES**

EXAM TITLE:

AUTOMOTIVE ELECTRICITY AND ELECTRONICS

OPTION: Motor Vehicle Mechanics (MVM)

DURATION: 3 hours

INSTRUCTIONS:

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

Section I: Twenty (20) compulsory questions. 55 marks

Section II: Attempt any three (3) out of five questions. 30 marks

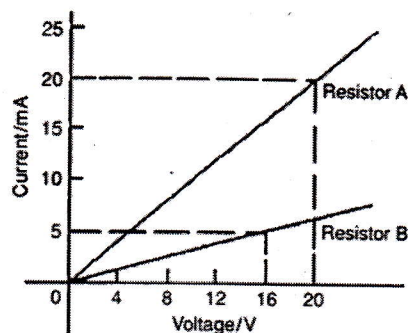
Section III: Attempt any one (1) out of three questions. 15 marks

Note:

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

Section I. Twenty (20) Compulsory questions**55 marks**

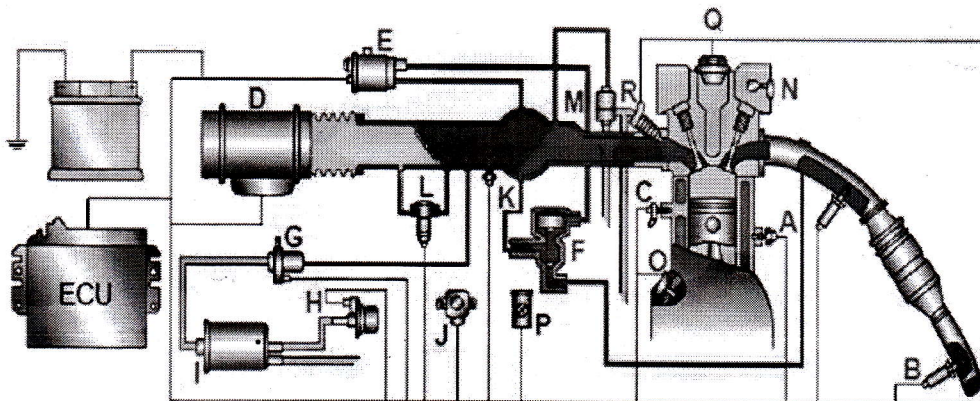
01. Why should the battery be not overcharged? (2 marks)
02. What should be considered when a technician determines the correct battery to be installed into a vehicle? (3 marks)
03. What five tasks does battery maintenance typically include? (5 marks)
04. What are the three basic starting motor problems when trying to start the engine? (3 marks)
05. Discuss the function of the overrunning clutch in the engine starting system. (2 marks)
06. What is the purpose of the starting system in a vehicle? (2 marks)
07. List three functions of a starter relay. (3 marks)
08. Describe the purpose of an ignition system. (2 marks)
09. Describe function of each of the following components in ignition system:
a) coil wire c) distributor cap
b) spark plug wire d) sensor coil (4 marks)
10. What parts are found in electronic ignition system but not in conventional ignition systems? (2 marks)
11. Name two sources of electrical current in automobile. (1 mark)
12. Explain what a one -wire system is. Give any advantage to have a one- wire system in the automobile. (2 marks)
13. In automotive wiring, differentiate primary wiring from secondary wiring. (2 marks)
14. Explain the purpose of having the following components in automobile lighting system.
a) Turn signal flasher
b) Automatic headlight dimmer
c) Backup lamp switch (3 marks)
15. The current/voltage relationship for two resistors A and B is as shown in Fig. below; determine the value of the resistance of each resistor

**(3 marks)**

16. What are the four factors that determine how much voltage is induced by a magnet? (4 marks)
17. a) With the help of the symbols, differentiate NPN from PNP transistors.
b) Give three (3) types of transistor configurations (connections). (4 marks)
18. A simple automotive circuit is made up of three parts, what are they? (3 marks)
19. Differentiate an AC current from a DC current. (2 marks)
20. Explain the following terms:
a) Forward bias c) Light Emitting Diode(LED)
b) Avalanche diodes (3 marks)

Section II. Choose and Answer any three (3) questions 30 marks

21. With the help of detailed diagram, describe the construction and working of starting system for automobile. (10 marks)
22. In electronic ignition system shown below, name any ten (10) of labeled sensors.



(10 marks)

23. Three lamps A, B and C, having resistances of 1440Ω , 960Ω and 576Ω , are connected in parallel to a 240 V supply by a cable of resistance 2Ω .
Calculate:
(a) The total circuit resistance, the total current and the cable voltage drop
(b) The voltage across the lamps and the current drawn by each lamp.

(10 marks)

24. A Mitsubishi AC generator uses an internal voltage regulator, two separate wye connected stator windings. Each of the stator windings has its own set of six diodes for rectification. It also uses a diode trio to rectifier stator voltage to be used in the field winding and the three terminals are connected as follows:

- B terminal: connects the output of both stator windings to the battery, supplying charging voltage.
- R terminal: supplies 12 volts to the regulator
- L terminal connect to the output of the diode trio to provide rectified stator voltage to designed circuit.

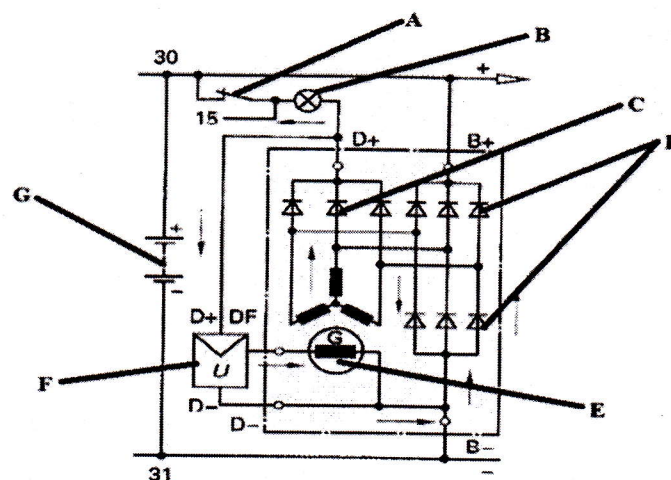
According to the information given above, draw the Mitsubishi AC generator circuit diagram. (10 marks)

25. List down various battery troubles and their possible causes. (10 marks)

Section III. Choose and Answer any one (1) question 15 marks

26. With the help of a neat diagram explain the working principle of the basic ignition system. (15 marks)

27. a) Name the labeled parts of the following figure:



b) Sketch a simplified wiring of a center high mounted stop light (CHMSL) system in a three-bulb. (15 marks)

28. a) What is the role of a window regulator?
 b) Draw the wiring diagram of power window circuit using two -field coil motors.
 c) Explain the operation of a two- coil fuel gauge.

(15 marks)