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Unit Standard 30571

PRACTICE PAPER - ANSWER BANK

Assessors Note:

This answer bank should be used as the primary resource when marking students work. However, responses to some questions may be subjective and tutors are advised to exercise their professional judgement when making assessment decisions.

ELEMENT ONE

Demonstrate knowledge of automotive electrical principles

1. What does the term “conventional current flow” mean?

Current (was thought to) flows from positive to negative

2. What does the term “electron current flow” mean?

Current actually flows from negative to positive

3. Describe the properties of each of the following:

Conductor

A substance in which electrons move easily.

Insulator

A substance that prevents electrical current from flowing.

Electron

Has a negative electrical charge

Proton

Has a positive electrical charge

4. Which ONE of the following statements is true? Please circle A, B or C.

A

A semi-conductor is a material that can act as both a conductor and insulator.

B A semi conductor can only act as a conductor.

C A semi conductor can only act as an insulator.

5. Explain what is meant by the following electrical terms:

EMF

EMF is measured in Volts, and refers to the electrical pressure causing electrons to flow in a conductor.

Counter EMF

When a voltage is applied to a coil of wire with a soft iron core an electromagnet field is produced. If the circuit is switched off, the magnetic field collapses that creates a counter electromagnetic against the supply voltage. This is known as counter electromagnetic force (CEMF).

Attraction and repulsion of charges

The basic law of electric charge fields is that like charges repel and unlike charges attract. This does not come out

Potential difference

The potential difference is a measure of the difference in voltage between two points of a circuit.

6. Show the symbol and describe what each unit measures:

Unit of measurement	Symbol	What it measures?
Amp	A	The measure or unit of Electron flow
Ohms	Ω	The measure or unit of resistance to electron flow
Hertz	Hz.	The frequency of oscillations per second
Volt	V	Volts are units of electrical pressure.
Watt	W	The watt is the unit of power
Farad	F	Farad is the unit of capacity.

7. Describe three characteristics of a series circuit.

There is only one path for the current to flow.
Current is equal in all parts of the circuit.
A break in one part will stop current flow in the whole circuit.
The total resistance is the sum of the individual values
The voltage drops across each resistor will vary in proportion to the resistance value.

8. Describe three characteristics of a parallel circuit.

Total resistance always less than the smallest value.
Current flow in each branch varies with its resistance.
Voltage across each branch is equal.
Individual branch currents add up to total current.

9. What is an open circuit and what effect will it have on current flow in the circuit?

A circuit that has a break in it that stops the flow of current.

10. What is a short to ground and what effect will it have on current flow in the circuit?

A circuit that has direct contact with the chassis through faulty insulation resulting in high current flows.

11. Briefly explain each of the following terms and provide an automotive example of each:

Load device

A device that uses electricity to do work, and the resistance allows for a specific amount of current flow through it.

Automotive example: Starter motor, light bulb, wiper motor, window demister, etc

Power sources

A constant power supply that can be accessed on demand.

Automotive example: Car battery

Protection devices; A device that protects the whole circuit including all components.

Automotive example: Fuses, circuit breakers

Conductors

Anything that allows electricity to easily flow through it.

Automotive example: Copper wiring, Aluminium, steel, Iron

Controls: Anything that controls the flow of electricity, ie stops it or starts it flowing

Automotive example: Light switch, Ignition switch, Radio switch, Heater/air conditioning switch etc

12. What does OHMS law say about the relationship between Volts, Amperes and Ohms?

“The current flowing in a circuit is directly proportional to the applied voltage and inversely proportional to resistance of the circuit”.

In simpler terms this means that when resistance in a circuit goes up, the current goes down, or when the resistance goes down, the current goes up, as long as the voltage stays the same. If the voltage is varied up, the current flow goes up with it, and if the voltage goes down the current goes down, as long as the resistance stays the same.

13. Briefly describe each of the following resistors and provide an automotive example of each.

Carbon pile resistor:

Comprise of a stack of carbon elements to make up the resistor.

Automotive example:

Carbon pile resistors are generally found in high rate discharge battery testers.

Wire wound resistor;

Are a fixed resistor which are commonly made by winding a resistive metal wire around a ceramic core.

Automotive example: Ballast resistor in ignition system,

Variable resistor:

Variable resistors can be either Rheostats or Potentiometers. Turning the control moves the sliding contact, away from, or towards the fixed end tap, increasing or decreasing the resistance. This is used to vary the current flow in a circuit.

Automotive example:

Vane type Air flow meters, throttle position sensors and the tank unit of a fuel gauge circuit uses this type of resistor.

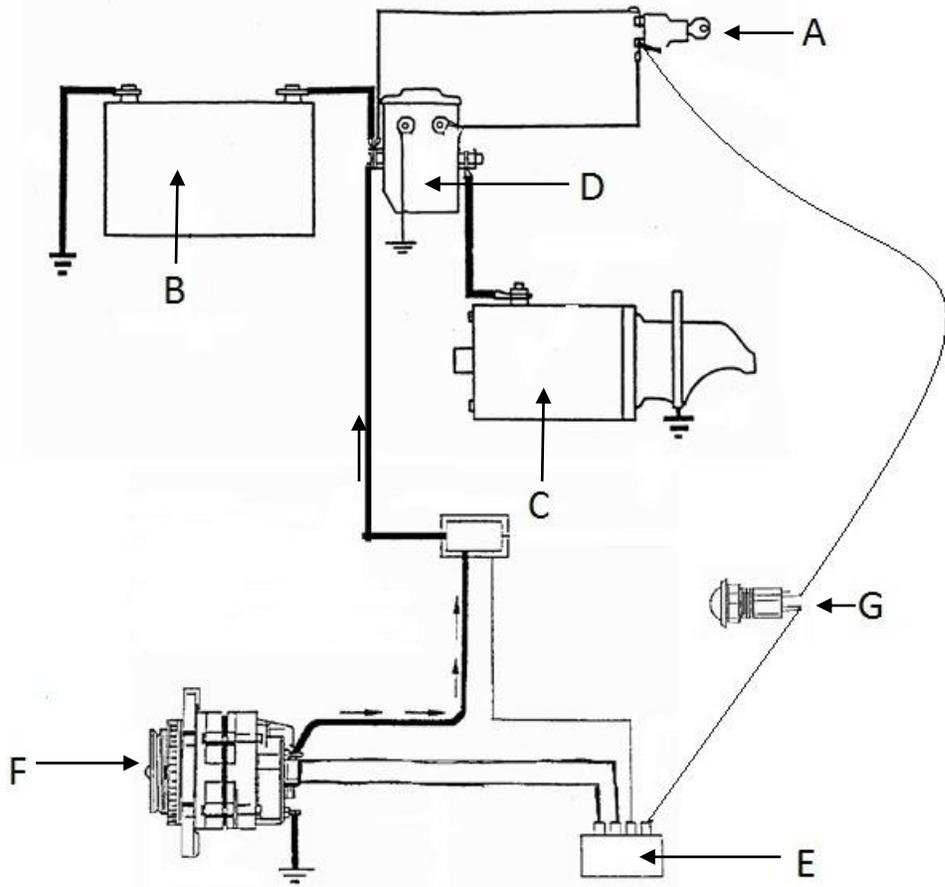
14. Explain why manufacturers place coloured bands on colour coded resistors

Each coloured band refers to a number that is recorded on a resistor look up table. By using these numbers it's possible to calculate the value of the resistor

15. Complete the following table by explaining each capacitor function and providing an automotive example for each.

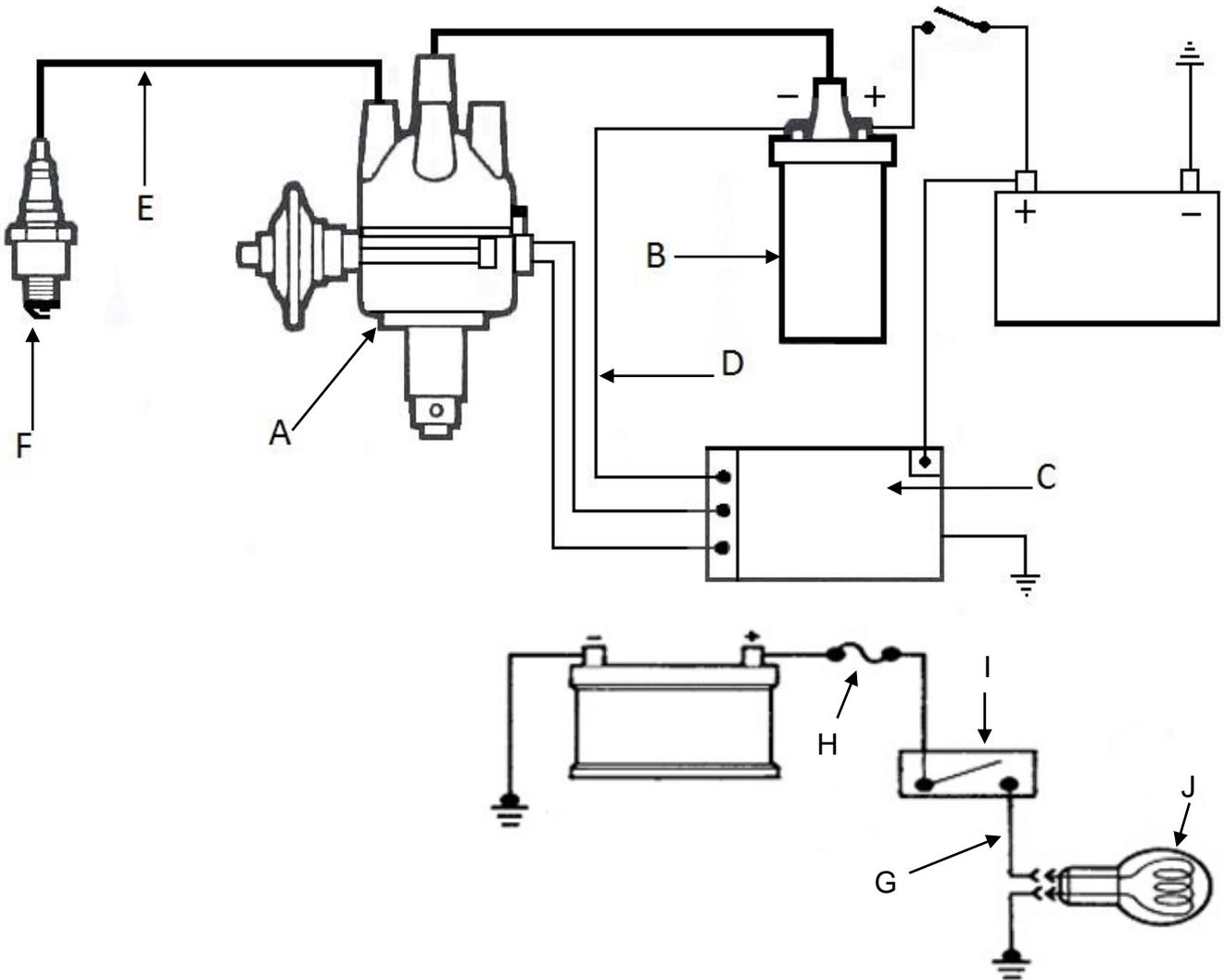
Function	Explanation	Automotive example
Storage	Soaks up and stores electrical current or EMF, offers an alternative path for current to flow.	Fitted to distributors with breaker points to absorb electricity when the points open. This stops the points from arcing and burning out prematurely.
Smoothing	Filters voltage spikes to prevent damage to electronics	Alternators, ECU, to smooth out the voltage and make it consistent.
Suppression	Absorb electrical interference from forces outside the circuit such as static electricity.	Fitted to ignition coil, alternator or other devices to stop static interference with radio signals or ECU signals.

16. Identify the components labelled A-G in the diagram below of starting and charging systems.



A	Ignition/Starter Switch.
B	Battery
C	Starter motor
D	Starter Solenoid
E	Voltage regulator
F	Alternator
G	Charge warning light

17. Identify the components labelled A-J in the diagrams below.



A	Distributor	B	Ignition coil
C	Electronic control unit	D	Low tension lead
E	High tension lead	F	Spark plug
G	Wiring	H	Fuse
I	Switch	J	Bulb