FEDS FAIRVIEW EDUCATIONAL SERVICES LTD

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ANSWER BANK

SAMPLE ASSESSMENT INSTRUCTIONS

PLEASE MAKE SURE TO READ AND SIGN THIS SECTION

ASSESSMENT INSTRUCTIONS

- Before starting this assessment you should have achieved a mark of at least 80% for your workbook.
- Use a black or blue ball point pen. (do not use pencil)
- Write your full name on the cover page.
- This is a closed book assessment, so you cannot bring any reference material in, or seek help from anyone else.
- You need to answer all the questions.
- Read the questions carefully, and give detailed answers when asked to.
- You must complete the assessment under exam conditions.
- To achieve the unit standard you must show competency for each outcome.

Complete the following by circling Yes or No as appropriate:

Are you ready to be assessed? **Yes** **No**

Have the assessment instructions these been explained to you? **Yes** **No**

Do you understand the assessment instructions? **Yes** **No**

Have you all the materials/resources that you need for this assessment? **Yes** **No**

Please sign to acknowledge that you have read these instructions and are ready to be assessed.

Student Signature: _____ **Date:** _____

You must complete the assessment instructions on Page 2 before starting this assessment!

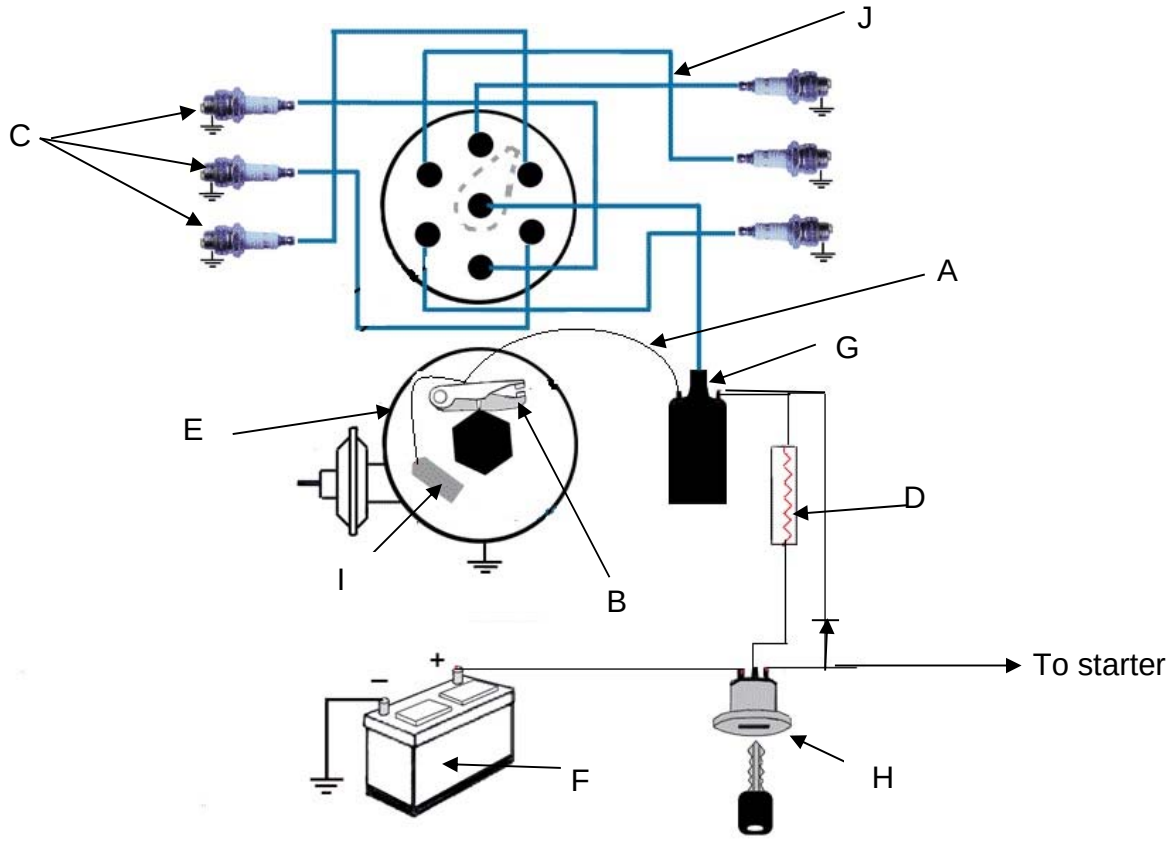
ELEMENT ONE

Demonstrate knowledge of the operation of a contact breaker ignition system.

1. From the list provided identify the contact breaker ignition system components listed A-I in the diagram below.

Ballast resistor, Battery, Capacitor, Distributor,
Ignition switch, Contact breakers, High tension leads,
Low tension lead, Coil, Spark plugs

A	Low tension lead	**F**	Battery
B	Contact breakers	**G**	Ignition switch
C	Spark plugs	**H**	Ignition switch
D	Ballast resistor	**I**	Capacitor
E	Distributor	**J**	High tension leads



2. From the diagram above describe how the contact breaker (points) interrupt the primary (low tension) circuit.

The contact breakers (often called “points”) are contacts which are held closed by spring pressure. While they are closed power will flow through the primary circuit. The contact breakers are opened by a cam which is rotating in the centre of the distributor (the black hexagonal shape in the diagram). The distributor cam is usually connected to the valve cam because the timing of the contact breakers opening has to be exact in relation to the piston position, usually just before top dead centre on the compression stroke.

3. Match up the contact breaker ignition system components with their function. For example:

A – Battery = 3 – Provides current for the ignition system

A	**Battery**	**A3**	1	Produces a spark to ignite the air/fuel mixture in the combustion chamber
B	Starter solenoid	**B5**	2	Produces a magnetic field within the ignition coil
C	Spark plugs	**C1**	**3**	**Provides current for the ignition system**
D	Condenser	**D4**	4	Designed to absorb current and to prevent arcing at contacts
E	Contact breaker points	**E9**	5	Receives battery voltage when the ignition switch is in the start position to activate the starter motor
F	Primary winding	**F2**	6	Reduces voltage supply to the coil primary circuit when the engine is running
G	Secondary winding	**G10**	7	To switch the ignition on and off and to operate the engine starter motor
H	Distributor	**H8**	8	Relays high voltage spark to the right cylinder at the correct time
I	Rotor	**I11**	9	Interrupts the primary circuit
J	Ballast resistor	**J6**	10	Steps up the primary coil voltage to around 30,000v
K	Ignition switch	**K7**	11	Provides a means of passing HT voltage from the coil to the spark plug via HT leads

4. Describe how interrupting the current flow in the primary winding of the ignition coil will induce a much higher voltage in the adjacent secondary winding.

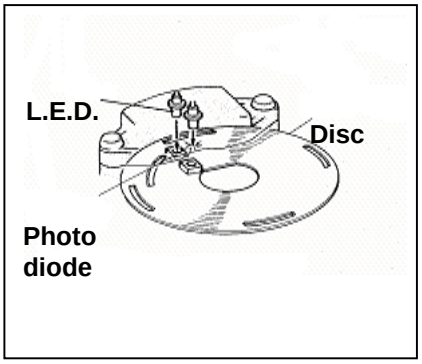
When the current is flowing through the primary windings it produces a magnetic field which envelopes the adjacent secondary windings which are many thousand times greater than the primary windings. When the current flow is suddenly stopped the magnetic field collapses back through the secondary windings. This sudden collapse of the magnetic field induces a voltage in the secondary windings and because the secondary windings are many thousand times greater than the primary windings the voltage that is produced is also many thousand times greater than what was flowing through the primary windings of the coil. The voltage produced from an ignition coil can be as high as 50 thousand volts or more. This process is called “mutual induction”.

ELEMENT TWO
Demonstrate knowledge of the operation of distributor type electronic ignition systems.

1. Identify the ignition sensors (A-C) as shown in the diagrams below and explain their operation.

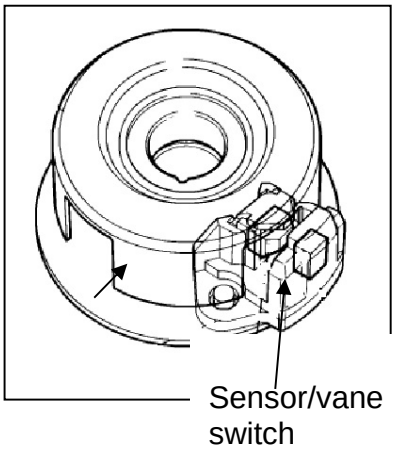
A: Name: **Optical trigger**

Uses a light beam to switch the primary circuit on and off. The ignition primary coil is switched on when it receives the infra-red light from the LED and switches off as the chopper interrupts the light beam.



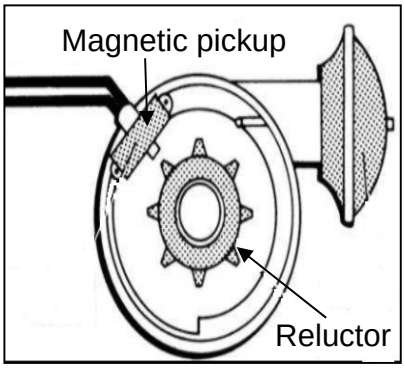
B: Name: **Hall Effect**

Diverts the magnetic field by using rotating vanes to switch the primary circuit on and off. As the window between the vane goes past the magnetic field it switches the primary circuit on until the rotating vane blocks off the field and switches it off again.



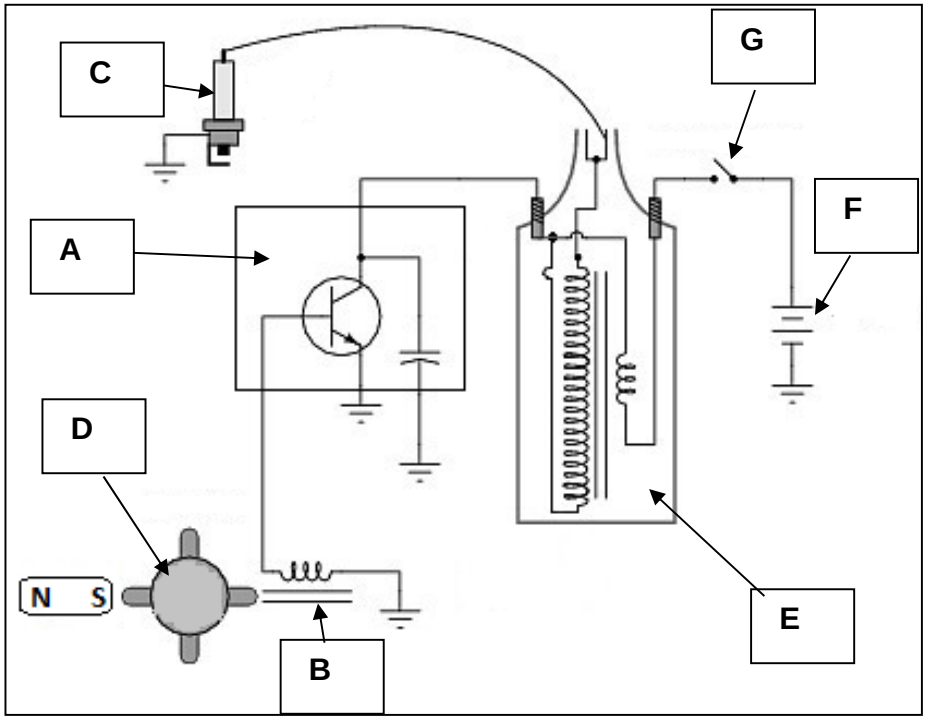
C Name: **Inductive Pickup**

Uses a rotating reluctor to change the strength of the magnetic field that is acting upon a small coil to produce a voltage to switch the primary circuit on. As the reluctor moves away the field reduces in strength and the primary circuit is switched off again.



2. Identify the electronic ignition system components labelled A, B, C, D, E, F and G.

A: Transistorised ignition module;
B: Magnetic pickup
C: Spark plug;
D: Reluctor/position sensor,
E: Coil,
F: Battery,
G: Ignition switch,



3. Describe the operation of the electronic ignition system above.

This ignition system detects the crankshaft angle from the reluctor/position sensor and sends electrical impulses to the ignition module.
The module allows battery current to flow through the coil primary winding to earth. When the pulse generator sends a signal to the module the module switches off the flow of current through the coil primary windings, thereby inducing a high voltage in the secondary windings of the coil. The high voltage is distributed to the spark plugs.

4. List two precautions that should be taken when working with electronic ignition systems.

Any two of the following:

- Do not touch the HT leads or any electronic ignition component with the ignition key on.
- Use the dummy spark plug (that must be earthed) when checking for a spark.
- Diagnose faults according to manufacturer's specifications.
- When welding disconnect both battery terminals.
- Use meters with a high resistivity 100,000 S/V minimum i.e. digital meters.
- Handle all components carefully.

5. Match up the electronic ignition system components with their function. For example:

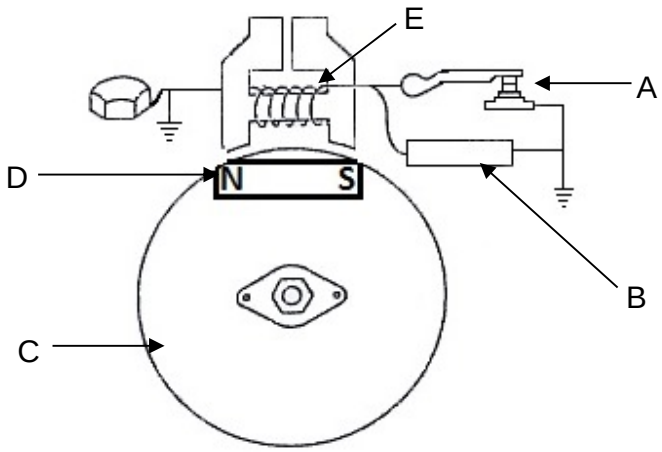
A – Battery = 3 – Provides current for the ignition system

A	**Battery**	**A3**	1	Will open circuit if excessive current passes through
B	Fuse	**B1**	2	Relays high voltage spark to the right cylinder at the correct time.
C	ECU	**C6**	**3**	**Supplies electricity for the ignition system**
D	Sensor	**D5**	4	To switch the ignition on and off and to operate the engine starter motor
E	Ignition coil	**E7**	5	Interrupts primary circuit to induce high voltage in secondary circuit.
F	Distributor	**F2**	6	Monitors engine performance and makes automatic adjustments to meet the engine demands.
G	Ignition switch	**G4**	7	Generates high voltage for the high tension lead to the spark plug.

ELEMENT THREE
Demonstrate knowledge of the layout and components of magneto ignition systems.

1. From the diagram of the magneto ignition system below, identify the following components.

Capacitor Contact breaker Coil Flywheel Magnet



A: Contact breaker

B: Capacitor

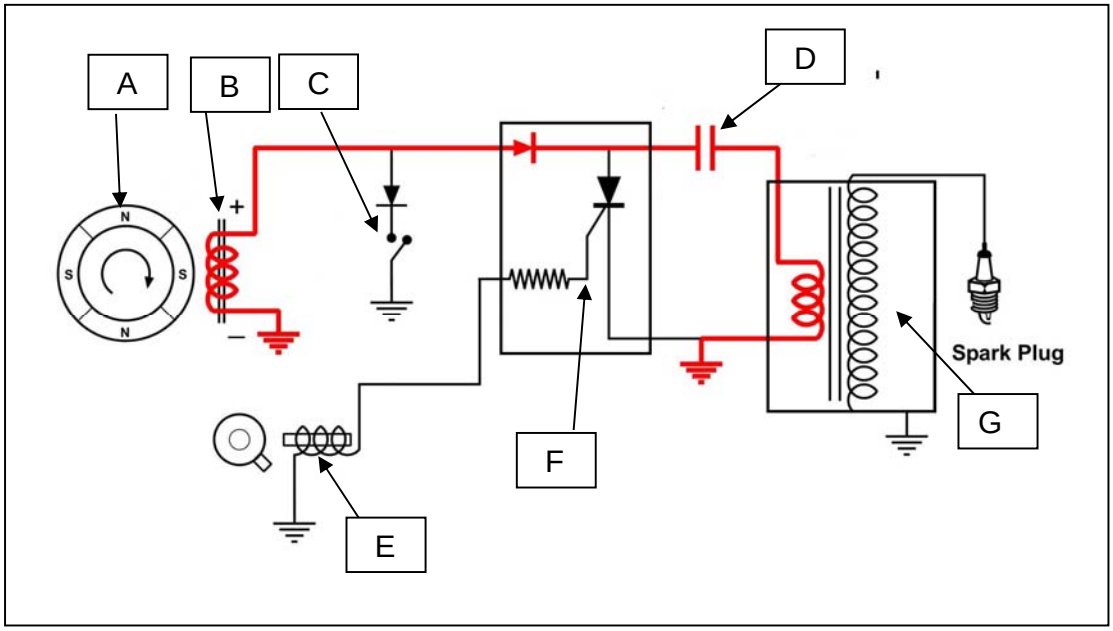
C: Flywheel

D: Coil

E: Magnet

2. From the diagram of the capacitor discharge ignition system, identify the following components.

Magnet Ignition coil Exciter coil Capacitor
Trigger coil Ignition switch Thyristor



A: Magnet

B: Exciter

C: Ignition switch

D: Capacitor

E: Trigger coil

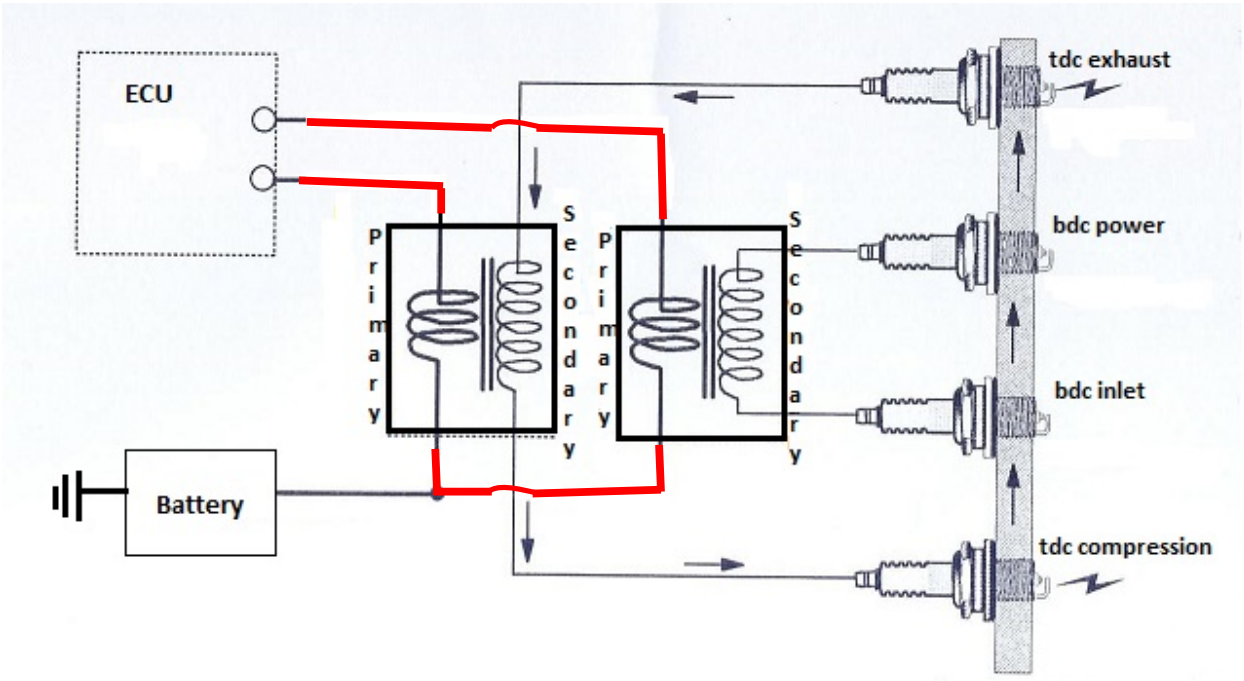
F: Thyristor

G: Ignition coil

ELEMENT FOUR

Demonstrate knowledge of the circuit layout and components in distributorless ignition systems.

1. Complete the primary circuit for the waste spark ignition system shown below.



2. How many ignition coils are used in the system shown above?

Two

3. Name the type of ignition system shown below and identify the components.

Ignition system type: **Coil on Plug**

1. Coil

2. Spark plug