

### Translation

- ١- \*An engine is a related group of parts assembled in a specific order .it is designed to convert the energy given off by burning fuel into a useful form  
المحرك هو\* مجموعه اجزاء متصله ومركبه بنظام معين .وهو مصمم لتحويل الطاقه المنطلقه من الوقود الي شكل يمكن الاستفادة منه .
- ٢- \*The main parts of an engine are : block , cylinder ,piston ,crankshaft ,connecting rod , bearings and flywheel.  
الاجزاء الاساسيه للمحرك هي القالب - الاسطوانه - المكبس - عمود المرفق - راع التوصيل - كراسي التحميل والحدافه .
- ٣- The main parts of the primary circuit are the battery ,ignition switch ,resistor , contact points and coil primary wiring .  
الاجزاء الاساسيه للدائره الابتدائيه هي البطاريه - مفتاح الاشعال - المقاومه - نقاط الاتصال - اسلاك الملف الابتدائي .
- ٤- \*The electronic sensors monitor various engine functions and feed this information to computer .  
لحساسات الاكترونيه تراقب وظائف المحرك المختلفه وتغذي هذه المعلومات الي الحاسب ( وحده التحكم ) .
- ٥- The four major parts of automobile are the framework ,engine ,power train and chassis.  
الاجزاء الاربعه الرئيسيه للسياره هي الهيكل - المحرك - اجهزه نقل القدره والشاسيه .
- ٦- \*The oxygen sensor monitors the amount of oxygen in the engine's exhaust gases . It mounted in the exhaust manifold . The computer uses signal from oxygen sensor to control the air fuel ratio.  
ترصد حساس الاكسجين كميته الاكسجين في غازات عادم المحرك . ويتم تثبيته علي مجمع العادم ويستخدم الكمبيوتر الاشاره الصادره من حساس الاكسجين للتحكم في نسبة الهواء الي الوقود .
- ٧- \*Engine speed sensor monitors engine revolution per minutes .it mounted to monitor crankshaft or camshaft rotation .  
يرصد حساس سرعه المحرك عدد لفات المحرك في الدقيقه ويثبت ليرصد دوران عمود الكامات و الكرنك .
- ٨- \*The battery is the source of electrical energy needed to operate the ignition system . The battery stores and produces electricity through chemical action .  
البطاريه هي مصدر الطاقه الكهربيه المطلوبه لتشغيل نظام الاشعال . تخزن وتنتج البطاريه الكهرباء من خلال تفاعل كيميائي .
- ٩- \*When the piston reaches the bottom of the power stroke ,the exhaust valve opens . The spinning crankshaft forces the piston up through the cylinder ,pushing burned gases out .  
عندما يصل المكبس الي قاع او نهايه شوط القدره , يفتح صمام العادم . يدفع عمود الكرنك الدوار المكبس لاعلي خلال الاسطوانه دافعا الغازات المحترقه للخارج .
- ١٠- \*There are some systems that helping the engine to succeed in its operation .These systems are ,lubrication system , cooling system , fuel system , ignition system and electrical system  
يوجد بعض الانظمه التي تساعد المحرك ان يعمل بنجاح اثناء التشغيل , هذه الانظمه هي : نظام التزييت - نظام التبريد - نظام الوقود - نظام الاشعال - النظام الكهربى .
- ١١- \*There are no mechanical devices to make and break the circuit in electronic ignition system .the entire process is done electronically .current flows from the ignition switch through the ignition module to the coil .  
في نظام الاشعال الالكتروني لا يوجد اي اجهزه ميكانيكيه لفصل ووصل الدائره . تحدث العملية كليا بشكل الكتروني يسري التيار من مفتاح الاشعال خلال وحده الاشعال الي ملف الاشعال .



\* ① The engine is designed to convert energy given off by burning fuel to useful form (convert fuel to energy). The main parts of an engine are :- block, cylinder, piston, crankshaft, connecting rod, main bearings, flywheel, camshaft and valves. The flywheel is necessary to the engine to keep crankshaft turning during four required strokes. Connecting rod connects crankshaft to piston. The container is called the block. The camshaft is driven by gears and belts. Engine can classify in many ways. The most commonly used classifications are by: cycle, valve location, cylinder arrangement, fuel used, cooling and number of cylinders. The head valve engines are universal used today

\* ② The modern automobile is made up of many different systems with hundred components. The four major parts of automobile are: framework that is the foundation of the automobile. It serves as a platform to which other automobile's components attach. There are some shapes of framework like square or box-shaped steel and it is made of number of welded parts. The engine that it provides power to drive the automobile. Powertrain that is responsible for transmitting power from engine to wheels. Chassis that is the internal platform of automobile. There are some systems that help the engine to work efficiently. They are: cooling system, lubrication system, fuel system, electrical system and ignition system

\* ③ The purpose of the ignition system is to provide a high voltage spark in each of the engine's cylinders at the right time so that the mixture will burn. The system must take the 12volts of electricity available at the battery or alternator and boost it to the 30000 or 40000 volts required for ignition. The ignition system is divided into two separate circuits. they are called primary and secondary circuits. The primary circuit consists of : battery - ignition switch - resistor - ignition module or contact points and coil primary wiring. The primary circuit voltage is low and operating on battery's 12 volts. The battery is the source of electrical energy needed to operate ignition system. Secondary circuit consists of : secondary wiring, distributor and spark plugs. The spark plug made up of 3 major parts: electrodes, insulator and shell.

\* ④ The electronic sensors monitor various engine functions and feed this information to the computer. Information enter the computer where it is processed into commands to the fuel injection and other devices. The types of sensors are : Oxygen sensor that monitors the amount of oxygen in engine's exhaust gases. Engine speed sensor that monitors engine RPM. Throttle position sensor that throttle position relayed to computer by the throttle position sensor. Manifold vacuum sensor that engine load transmitted to computer by means of an intake manifold vacuum sensor. Temperature sensor that it measures temperature of engine coolant.

\* ⑤ Fuel injection is the process of spraying fuel directly into the engine. Fuel sprayed in a cone shaped -pattern for achieving maximum distribution and atomization. The fuel injection system controls the air fuel mixture by modifying either the system pressure or opening the injectors. The spraying action of the injectors atomizes the fuel allowing it to better mix with the air. Although the fuel injection system doesn't use the carburetor, the system have a throttle body to control air flow. There are two kinds of gasoline injection system. They are mechanical fuel injection systems and electronic fuel injection systems. The fuel is sprayed into the cylinder or into the intake manifold. The electronic fuel injection system delivers fuel under pressure to the injectors.



## **Paragraphs f Elc Ign Eng Aut sens**

# 6 In simple electronic ignition circuit, there are no mechanical devices to make and break the circuit. The entire process is done electronically. Current flows from the ignition switch, through the ignition module to ignition coil. The ignition module contains the switch the electronic components which cause the coil to produce a high voltage spark. Current from ignition switch enters the module and passes through a power transistor before reaching to coil. The power transistor acts like a conductor, allowing full current to flow in circuit. This begins to build up the magnetic field in the coil. Electronic triggering devices send a signal current to the ignition module that breaks the primary circuit.

7 Diesel engines are used for automobiles and light trucks. The diesel engine uses the heat of compression instead of a spark plug to light fuel. Diesel fuel injection is similar to gasoline injection but requires a high injection pressure. Typical diesel system components include: the tank, fuel pump, filter, injection pump, injectors and fuel lines. Diesel fuel is injected into the cylinder at the top of compression stroke. Due to high compression used in diesel engines, the diesel injection pump must be capable of producing high pressures. There are two general types of diesel injection pumps: inline and distributor.

\*\*\*\*\* building of an engine - modern automobile - electronic sensors - fuel injection

### **: Quick look :**

#### 1- Mention the main parts of a simple engine

The main parts are: block (container), cylinder (hole in block), piston (lid), crankshaft, connecting rod, main bearings, flywheel, camshaft, valves and cylinder head

#### 2- Why is the flywheel necessary to the engine?

It is necessary to keep crankshaft turning during the four stroke cycle.

#### 3- On what strokes both valves are closed in four stroke cycle?

In compression and power stroke

#### 4- What are the main parts of primary ignition circuit?

The primary circuit consists of: battery, ignition switch, resistor, ignition module or contact points and coil primary wiring.

#### 5- What is the function of ignition coil?

It is a transformer that is capable of increasing battery voltage to as much as 100000 volts

#### 6- What is the function of ignition switch?

It controls the flow of electricity across the terminals.

#### 7- Define battery and its function.

Battery is the source of electrical energy needed to operate the ignition system. It also stores and produces electricity through chemical actions



٨- What causes the electronic ignition module to stop the flow of primary current ?  
A signal from the triggering device

٩- What does fuel supply system consist of ?

Fuel supply system consists of : electric fuel pump مضخة الوقود tank خزان  
Filter المرشح Fuel rail مواسير الوقود  
Pressure regulator منظم الضغط Vibration dumper صمام التخلخل  
Fuel injection valves صمامات حقن الوقود

### **Complete**

- a- In **electronic ignition circuit**, there are **no mechanical devices** to make and break the circuit . the process is done **electronically** .
- b- There are three types of triggering devices **magnetic , hall effect and optical**
- c- Triggering devices operated by rotation of the **distributor shaft**
- d- There are two kinds of electronic gasoline injection system : **mechanical and electronic injection systems**

١١- What is the purpose of :

- \* **Oxygen sensor** .....> monitors the amount of oxygen in engine's exhaust gases
- \* **Engine speed sensor** .....> monitors engine RPM . and indicates the crankshaft and camshaft positions
- \*\* **Temperature sensor**.....> measures temperature of engine coolant
- \*\* **airflow sensor**.....> monitors the amount of air entering the engine

١٢- Mention the four major parts of the automobile .

- Framework( foundation of automobile )
- engine(provide power to drive automobile )
- power train (transmit power from engine to wheels )
- and chassis

١٣- What are the systems that help engine to work efficiency?

- Lubrication system** .....>circulates oil between moving parts to prevent metal to metal contact .
- Cooling system** .....> removes some heat of combustion and keep engine at an efficient operating temperature .
- Fuel system** ...>stores enough fuel for several miles
  - Delivers fuel to engine
  - Mixes fuel with right amount of air for complete burning in cylinder
- Ignition system** .....>provides a high voltage spark in each of the engine's cylinders at right time so that the mixture will be burnt .
- Electrical system** .....> powers all the accessories