# Marking Scheme
## CLASS-XII (2018-19)
## Auto Engineering -627
## (Group A)

| Question No. | **Answers** | Marks |
|---|---|---|
| Q1 | **C** | [1] |
| Q2 | C | [1] |
| Q3 | D | [1] |
| Q4 | D | [1] |
| Q5 | C | [1] |
| Q6 | B | [1] |
| Q7 | C | [1] |
| Q8 | B | [1] |
| Q9 | A | [1] |
| Q10 | B | [1] |
| Q11 | A | [1] |
| Q12 | C | [1] |

## (Group B)

| Question No. | **Answers** | Marks |
|---|---|---|
| Q13 | The working Principle of Hydraulic Jack:<br><br>It works on the principle of 'Pascal's Law', which states that – "In a fluid at rest in a closed container, a pressure change in one part is transmitted without loss to every portion of the fluid and to walls of the container." | [2] |
| Q14 | The functions of propeller shafts are:<br><br>• To transmit torque | [1/2] |

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| | • To allow different drive shaft angles<br>• To allow changes in length<br>• To reduce rotary vibrations | [1/2]<br>[1/2]<br>[1/2] |
| Q15 | The cooling system has four primary functions as follows:<br>• Remove excess heat from the engine,<br>• Maintain a constant engine operating temperature,<br>• Increase the temperature of a cold engine as quickly as possible,<br>• Provide a means for heater operation (warming the passenger compartment). | [1/2]<br>[1/2]<br>[1/2]<br>[1/2] |
| Q16 | • It connects the vehicle body and the wheels, and thus supports the weight of the vehicle.<br>• It transmits the driving and braking forces, which are generated due to friction between the road surface and the wheels, to the chassis and body, reduce the effect of shock forces to the occupants. | [1]<br>[1] |
| Q17 | The purpose of giving an inward inclination to king-pin or ball joint axis are<br>i) To keep the front wheels pointing forward.<br>ii) To bring back the wheels in a straight position after a turn. | [1]<br>[1] |
| Q18 | • A person should have completed 16 years to obtain license for 2 wheelers without gear.<br>• A person should have completed 18 years age to obtain license for 2 wheelers with gear,<br>Motor-car, Tractor and other non-transport vehicles. | [1]<br>[1] |
| Q19 | The cut-out relay is a safety device for battery. When the generator speed is very low, due to which the output is not sufficient to balance the battery voltage, the necessity to cut out the generator from the battery arises, because | [2] |

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| | otherwise the battery would discharge into the generator. When the engine and hence the generator speed has reached a sufficiently higher value to match its output to the battery voltage the generator should be automatically connected to the battery | |

**(Group C)**

| Question No. | **Answers** | Marks |
|---|---|---|
| Q20 | A hoist is a device used for lifting or lowering load, operated by means of mechanically, electrically, pneumatically or hydraulically.<br><br>Hoists can be classified according to the operating system as:<br><br>• Hydraulic hoist,<br><br>• Pneumatic hoist,<br><br>• Mechanical hoist, and<br><br>• Electric hoist | [3] |
| Q21 | The main role of the engine oil is to move the any system such as the piston in cylinder and the crankshaft smoothly. In order to achieve the objective:<br><br>• The oil forms an oil film at the metal surface to reduce the friction between the metal surfaces.<br><br>• The engine oil doesn't allow the combusted gas to leak to the crankcase.<br><br>• It cools the pistons and valves.<br><br>It gives washing action to the cylinder wall by moving away the micro particles (impurities) to the sump.<br><br>• It reduces the shock, transmitted from the piston to the crankshaft. | [1/2]<br><br>[1/2]<br><br>[1/2]<br><br>[1/2]<br><br>[1/2]<br><br>[1/2] |
| Q22 | **Merits of an air-cooling system**<br><br>• Air-cooled engines operate extremely well in both hot and cold | [1/2] |

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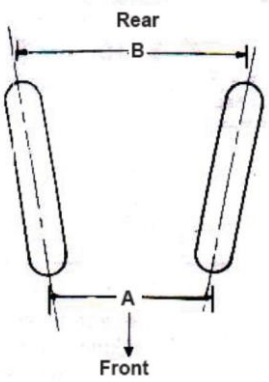
| | climates.<br><br>• Air-cooled engines are lighter than similar sized liquid/ water cooled engines.<br><br>• Air-cooled engines have no coolant leakage or freezing problems.<br><br>**Demerits of an air-cooling system**<br><br>• The large quantities of intake air passing into the cooling system can make the engine noisy.<br><br>• Each cylinder has to be separately cast, whereas a rigid monoblock construction is used by liquid/ water-cooled engines.<br><br>• To increase the air-cooling effect, an oil heat exchanger is required to prevent overheating of the lubricant. | [1/2]<br><br>[1/2]<br><br>[1/2]<br><br>[1/2]<br><br>[1/2] |
| Q23 | The following are the functions of the rear axles:<br><br>• They support the weight of the vehicle.<br><br>• They drive the rear wheels via the final drive.<br><br>• They rotate the power flow at the final drive by $90^0$ on either side for driving the wheels. | <br><br>[1]<br><br>[1]<br><br>[1] |
| Q24 | **Toe Angles (Toe-in and Toe-out):**<br><br>Toe-in is the amount by which the front wheels are set closer together at the front than at the rear when the vehicle is stationery. Toe-in is shown in the Fig. below i.e.; **Toe-in = B – A.**<br><br>  <br> | <br><br>[1]<br><br>[1/2] |

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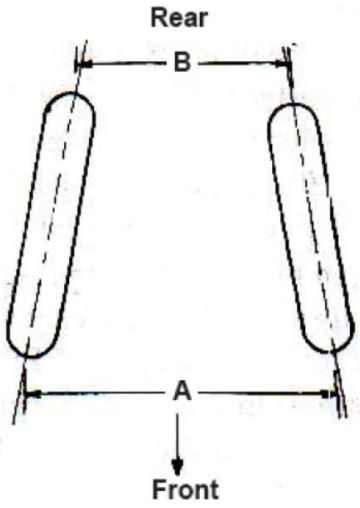
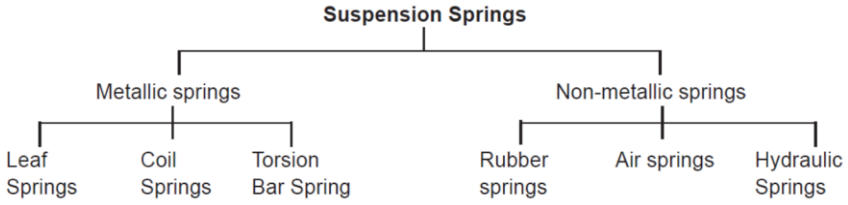
| | On the other hand, the wheels may be set closer at the rear than at the front, then it is called<br><br>toe-out. Toe-out is shown in the Fig below i.e.; **Toe-out = A – B.**<br><br>  <br> | [1]<br><br>[1/2] |
| Q25 | The suspension springs are classified as follows:<br><br>  <br> | [3] |
| Q26 | The spark plugs are classified according to the temperature range, which are of two types and they are designated as hot plug and cold plug. It will be seen that the hot plug has a longer heat path giving delayed cooling than the cold plug.<br><br>In general, it may be remembered that the hot plugs have a much longer insulator nose than the cold plugs. | [3] |

**(Group D)**

| Question | **Answers** | Marks |
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| No. | | |
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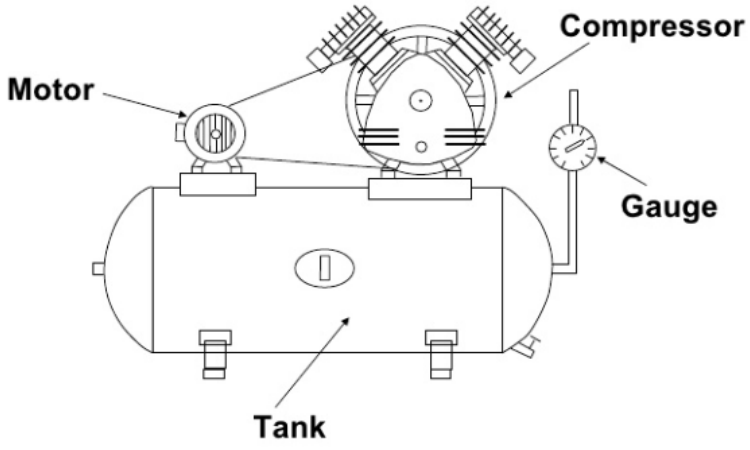
| Q27 | An air compressor is a machine that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (i.e., compressed air).<br><br>**Working principle of air compressor**<br><br>Air compressors collect and store pressurized air in a tank, and use pistons and valves to achieve the appropriate pressure levels within an air storage tank that is attached to the motorized unit. There are a few different types of piston compressors that can deliver even air pressures to the user.<br><br>Automotive compressors are combustion engine compressors that use the up-and-down stroke of the piston to allow air in and pressurize the air within the storage tank.<br><br>Other piston compressors utilize a diaphragm, oil-free piston. These pull air in, and pressurize it by not allowing air to escape during the collection period.<br><br>These are the most common types of air compressors that are used today by skilled workers and craftsmen. Before the day of motorized engines, air compressors were not what they are today.<br><br>Unable to store pressurized air, a type of antique air compressor may be found in the blacksmith's foundry bellows.<br><br>  <br> | [5] |
| Q28 | **Hydraulic hoist**<br><br>It uses high pressurized oil as operating medium to lift the vehicles so that tasks of washing, lubricating, maintenance and repair can be performed on the vehicles. Hydraulic hoist can be further classified as: | [5] |

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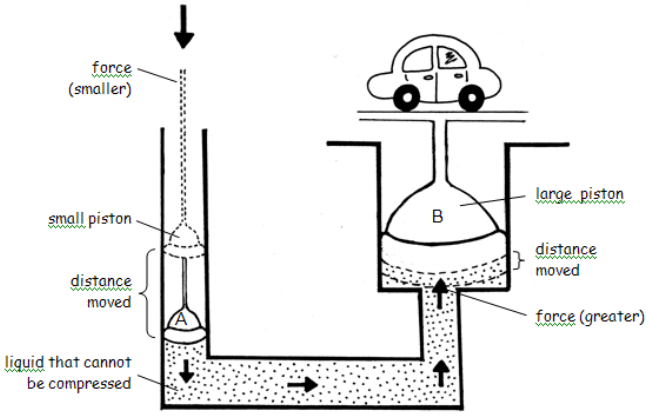
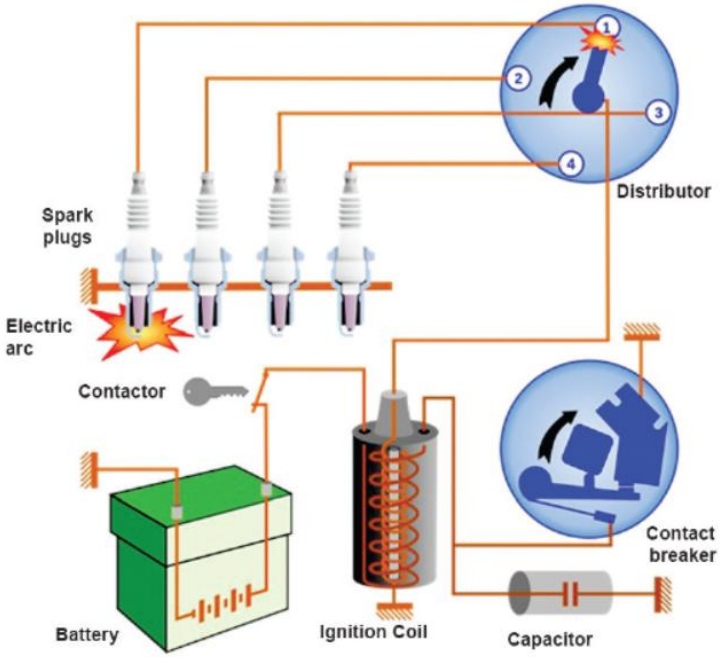
| | • Single post hydraulic hoist, and<br>• Two post hydraulic hoist<br>Working principle of hydraulic hoist<br>Hydraulic systems use an incompressible fluid, such as oil, to transmit forces from one location to another within the fluid. When the fluid under pressure is forced into the cylinder, the ram gets a push upwards. The platform carries the load or vehicle moves.<br>  <br> | |
| Q29 |  <br><br>When the ignition switch is 'ON' the current flows from the battery through the primary winding and produces a magnetic field in the coil. When the contact points open the magnetic field 12 volts from the | [5] |

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| | battery to high tension voltage of about 20 to 30 thousand volts required to jump the spark at the spark plug gap (15000 volts are needed to jump 1mm gap). The distributor then directs this high voltage to the proper spark plug when it jumps the gap, producing a spark which ignites the combustible mixture in the cylinder. | |
| Q30 | a)<br>  <br><br>b)<br>  <br><br>c)<br>  <br> | [5] |
| Q31 | a) At night<br>1) Aim your headlights correctly, and make sure they're clean<br>2) Dim your dashboard<br>3) Clean the windshield to eliminate streaks | [5] |

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| | 4) Slow down to compensate for limited visibility and reduced stopping time<br><br>5) Minimize distractions, like talking with passengers or listening to the radio, etc.<br><br>b) In slippery Condition<br><br>1) Slow down the vehicle as it takes longer to stop or adjust in wet weather.<br><br>2) Stay toward the middle lanes - water tends to pool in the outside lanes<br><br>3) Be more alert when driving in wet or slippery conditions. Watch out for brake lights in front of you.<br>4) Avoid using your brakes; if possible, take your foot off the accelerator to slow down | |