

CBSE | DEPARTMENT OF SKILL EDUCATION

AUTOMOTIVE (SUBJECT CODE 804)

CLASS XII (SESSION 2021-2022)
MARKING SCHEME FOR TERM - II

Max. Time Allowed: 1 ½ Hours (90 min)

Max. Marks: 30

SECTION A

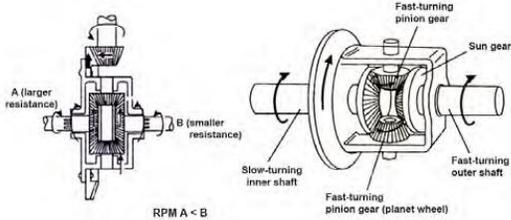
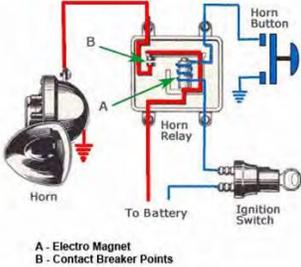
(3 + 2 = 5 marks)

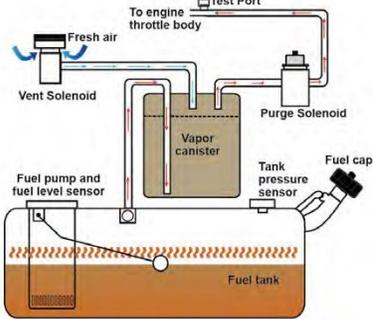
Answer any 03 questions out of the given 04 questions		1 x 3 = 3
Q.1	Name one barrier to becoming an entrepreneur. Answer: (any one will work) 1. Unsupportive Business Environment 2. Skilled workforce challenge 3. Market entry regulations 4. Shortage of capital 5. Lack of entrepreneurial mindset and training 6. Aversion to risk	1
Q.2	Define " Persistence " associated to an entrepreneur. Answer: Persistence: An entrepreneur is never disheartened by failures and keeps trying, adapting and iterating to overcome obstacles that come in the way of achieving goals.	1
Q.3	Which engineer's job is to design future transport that will be sustainable? Answer: The Clean Car Engineer's job is to design future transport that will be sustainable.	1
Q.4	Write full form of ITUC. Answer: Full form of ITUC: The International Trade Union Confederation	1
Answer any 01 question out of the given 02 questions		1 x 2 = 2
Q.5	Explain the different steps to creativity. Answer: Steps to creativity: 1. Substitute 2. Combine 3. Adapt 4. Modify 5. Put tot other use 6. Eliminate 7. Rearrange	2
Q.6	Explain the roles of green jobs. Answer: In order to ensure that our homes are safe from toxins and healthy places to breathe people with green collar jobs help us maintain a healthy environment.	2

SECTION B

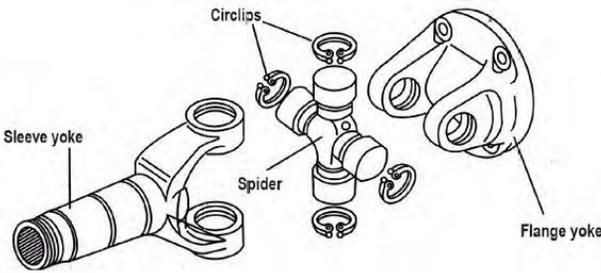
(5 + 6 + 6 = 17 marks)

Answer any 05 questions out of the given 07 questions		1 x 5 = 5
Q.7	In four wheel drive and rear wheel drive vehicles, Which component serves to transmit the drive force generated by the engine to the axles? Answer: Propeller shaft serves to transmit the drive force generated by the engine to the axles in a four wheel drive and a rear wheel drive vehicle.	1
Q.8	Define " Bouncing " in oscillation of sprung weight. Answer: Bouncing in the up and down movement of the auto body as a whole. When a car is running at high speeds on an undulating surface, bouncing is likely to occur. Also, it occurs easily when the springs are soft.	1
Q.9	Give function of a commutator in a generator. Answer: To charge a battery, the current should be unidirectional. Therefore, a commutator is fitted to reverse the connections of the external circuit to the generator in order to make the current unidirectional in that circuit.	1
Q.10	" Warning lamp does not appear when ignition switch is switched on ". Give possible reason for this. Answer: 1. Fused bulb 2. Defective switch 3. Defective Circuit of warning lamp	1
Q.11	" I am rectangular shaped copper block. I conduct heavy current to the armature ". Who I am? Answer: Carbon brush	1
Q.12	As per Motor Vehicle Act, What is the minimum time period beyond which if driving license is lost and expired, the case may be forwarded to the head quarter of transport department to obtain permission? Answer: 6 months	1
Q.13	In case of Private Vehicles (Petrol), what is the fitness certificates validity? Answer: 15 Years	1
Answer any 03 questions out of the given 05 questions		2 x 3 = 6
Q.14	Enlist different drawbacks of Semi-Floating type rear axle. Answer: The main drawbacks of Semi-Floating type rear axle are: i. The axle shaft has to bear the driving torque. ii. The axle shaft has to take the vehicle load. iii. The axle shaft has to take the cornering load when the vehicle is turning. iv. In case of breakage, the axle shaft of the vehicle will fall to one side of the ground.	2

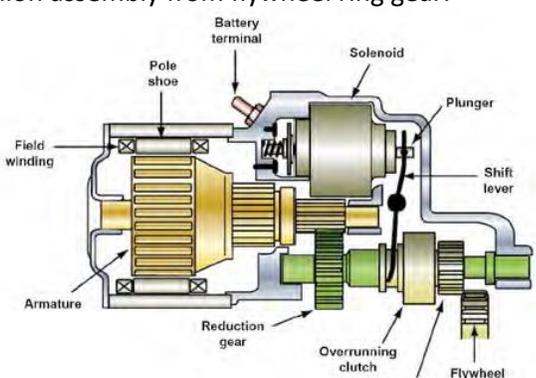
<p>Q.15</p>	<p>Briefly explain the operation of differential while vehicle taking a turn. Give suitable diagram also.</p> <p>Answer:</p> <p>When the vehicle is turning, the inside wheel travels less distance than the outside wheel. Since a resistance is therefore applied to the sun gear of turn taking side (say left-hand if it is turning to that side) and each differential pinion rotates around its own shaft (axis) and also revolves about the rear axle. As a result the rpm of the right-hand sun gear increases and it moves faster than the left side.</p>  <p>The diagram illustrates the differential gear assembly. On the left, a cross-section shows the internal components: a central housing (A) with larger resistance and an inner shaft (B) with smaller resistance. Below it, the text reads 'RPM A < B'. On the right, a side view shows the differential housing with a 'Fast-turning pinion gear' at the top, a 'Sun gear' on the right, a 'Fast-turning outer shaft' at the bottom right, and a 'Slow-turning inner shaft' at the bottom left. A 'Fast-turning pinion gear (planet wheel)' is also labeled at the bottom.</p>	<p>(1+1)=2</p>
<p>Q.16</p>	<p>Write down the main circuits and main parts of starting system of an automobile.</p> <p>Answer:</p> <p>The starting system mainly has two circuits:</p> <ol style="list-style-type: none"> 1. Starter circuit 2. Control circuit <p>The Starting system mainly consists of following parts:</p> <ol style="list-style-type: none"> 1. Battery 2. Starter switch 3. Starter motor 4. Starter drive 5. Heavy insulated cables from battery to starter motor 6. Ignition switch 	<p>(1+1)=2</p>
<p>Q.17</p>	<p>Briefly explain the horn circuit of a car using a labelled diagram.</p>  <p>The diagram shows the electrical circuit for a car horn. It includes a 'Horn' (represented by a bell icon), a 'Horn Relay' (a solenoid), a 'Horn Button' (a push-button switch), and an 'Ignition Switch'. The circuit is connected to a 'To Battery' terminal. Labels A and B point to the 'Electro Magnet' and 'Contact Breaker Points' of the relay, respectively.</p> <p>Answer:</p> <p>The driver uses the horn to warn others or to call attention to some hazard. Car horns work on the principle of a vibrating metal diaphragm. They are all electrically driven and consist of a solenoid (electromagnet) and a thin metal disc made of spring steel. When energised, the solenoid exerts a magnetic force on the disc, causing it to flex concentrically. The flexing of the diaphragm moves apart the electrical contacts, thus de-energising the solenoid. Once the disc springs back into its original shape, the electrical contacts close once again allowing current flow into the solenoid. The whole cycle is repeated for as long as the horn button is depressed. The flexing and de-flexing of the steel diaphragm in car horns happens faster than the eye can detect. However, the resulting vibrations produce noise we can hear.</p>	<p>(1+1)=2</p>

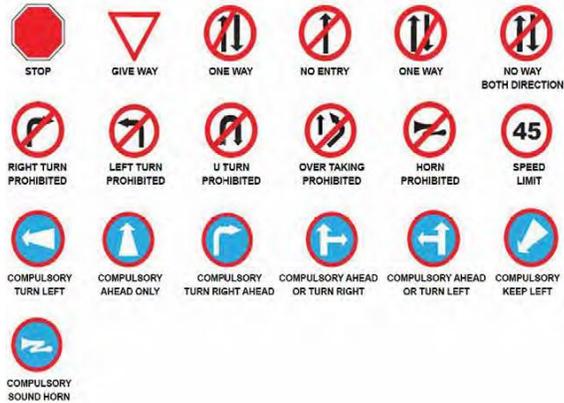
<p>Q.18</p>	<p>Explain evaporative emission control. Give suitable diagram also.</p> <p>Answer:</p> <p>Evaporative emission control system that captures any fuel vapours coming from the fuel tank and float bowl. It prevents the vapours from escaping into the atmosphere. Harmful hydrocarbon (HC) gas is generated in the fuel tank, and must not be discharged into the atmosphere. In some engines, such fuel vapour is stored temporarily in a container when the engine is off and is sent to the combustion chamber to be burned when the engine we turned on again.</p> <p>The charcoal canister is one such fuel vapour container. It is filled with activated charcoal and charcoal. When the engine is turned on, the gas is sent through the intake manifold to the combustion chamber where it is burned and becomes a harmless exhaust gas.</p> 	<p>(1+1)=2</p>
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Answer any 02 questions out of the given 04 questions **3 x 2 = 6**

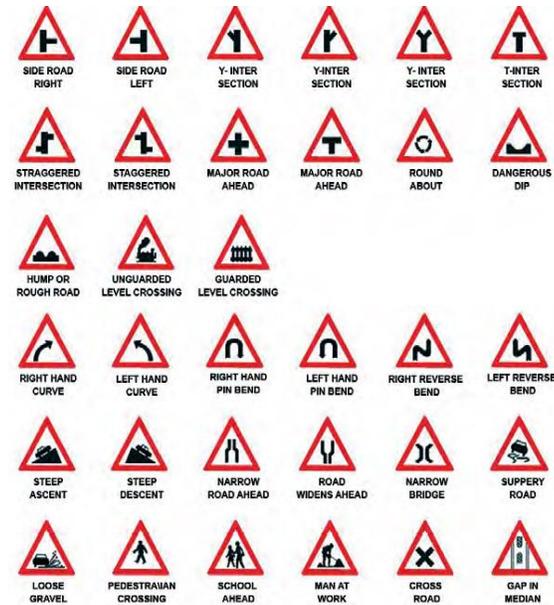
<p>Q.19</p>	<p>Explain spider type variable velocity joint using suitable diagram.</p> <p>Answer:</p> <p>Spider type: It is also commonly known as Hooke's joint or cross type. It is most common type of universal joint widely used in automobiles because it is simple in construction and reasonable efficient at small angles of up and down movement of propeller shaft.</p> <p>It consists of two Y-shaped yokes connected at right angles to each other by means of a cross or spider. The arms of the cross are called as trunnions. The needle type bearings are employed between the yokes and cross ends and the bearing cups are locked with yokes with the help of circlips.</p> 	<p>(2+1)=3</p>
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<p>Q.20</p>	<p>Enlist advantages (at least 6) of an alternators over a dynamo.</p> <p>Answer:</p> <p>Advantages of Alternators over Dynamo</p> <ol style="list-style-type: none"> 1. For same output, the alternator is much smaller in size as compared to a dynamo. 	<p>(0.5*6)=3</p>
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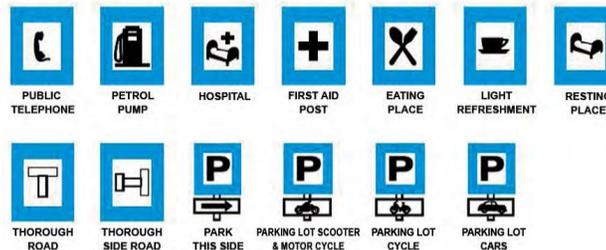
	<ol style="list-style-type: none"> 2. For same current output the alternator is lighter in weight. 3. Alternator can produce more current output at low engine speeds, even at idling. But dynamo can't do that. 4. Alternator requires lesser maintenance. 5. It is more reliable. 6. Maximum driving speed of alternator is comparatively higher than dynamo. 7. Alternator requires smaller size of driving pulley as compared to dynamo. 	
<p>Q.21</p>	<p>Explain the drive mechanism of self-starter assembly using suitable diagram.</p> <p>Answer:</p> <p>The main function of the drive mechanism of starter motor is that transmits the torque developed by the starting motor to the engine flywheel for cranking the engine. After which the engine continues to run. In this mechanism, a pinion is fitted on the motor's armature shaft which meshes with the flywheel ring gear and rotates the flywheel. When the engine is started and speeds up, the drive mechanism provide automatically come back of the pinion assembly from flywheel ring gear.</p> 	<p>(2+1)=3</p>
<p>Q.22</p>	<p>Explain different types of road safety signs. Draw minimum two road safety signs of each type.</p> <p>Answer:</p> <p>Traffic signs give information about the road condition, instruction to be followed at the junctions, guide drivers and ensure proper functioning of road traffic. Being unaware of road signs can lead to loss of life and property.</p> <p>Types of road safety signs:</p> <p>Road safety signs are of three types</p> <p>Mandatory signs: These signs are used to inform road users of certain laws and regulations to provide safety and free flow of traffic.</p>	<p>(2+1)=3</p>



Cautionary signs: These signs are used to warn the road users of the existence of certain hazardous condition either on or adjacent to the roadway, so that the motorists are cautious and take the desired action.



Information signs: These signs are used to guide road users along routes, inform them about destination and distance, identify points of geographical and historical interest and provide other information that will make the road travel easier, safe and pleasant.



SECTION C
(COMPETENCY BASED QUESTIONS)

(2 x 4 = 8 marks)

Answer any 02 questions out of the given 03 questions												
Q.23	<p>Victor found some noise coming out of his car's transmission in neutral speed position. Write down the important points (Any 4) to be checked for fault and their diagnosis.</p> <p>Answer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">Worn out shaft bearing/s</td> <td style="width: 50%; padding: 2px;">Replace the worn bearing/s</td> </tr> <tr> <td style="padding: 2px;">No lubrication in bearing/s</td> <td style="padding: 2px;">Lubricate the bearings/s. Replace if required.</td> </tr> <tr> <td style="padding: 2px;">Worn out gear; broken or chipped gear tooth/ teeth</td> <td style="padding: 2px;">Replace the damaged gear(s).</td> </tr> <tr> <td style="padding: 2px;">Worn out counter shaft</td> <td style="padding: 2px;">Replace the counter shaft.</td> </tr> <tr> <td style="padding: 2px;">Bent or damaged counter shaft</td> <td style="padding: 2px;">Replace the counter shaft.</td> </tr> </table>	Worn out shaft bearing/s	Replace the worn bearing/s	No lubrication in bearing/s	Lubricate the bearings/s. Replace if required.	Worn out gear; broken or chipped gear tooth/ teeth	Replace the damaged gear(s).	Worn out counter shaft	Replace the counter shaft.	Bent or damaged counter shaft	Replace the counter shaft.	1*4=4
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Q.24	<p>Write down the location and function of sensors (Any 4) listed below:</p> <p>a) Air Flow Sensor</p> <p>Answer:</p> <p>Air flow sensor is a device that is used in conjunction with an oxygen sensor to accurately measure the flow of air into a fuel injection engine. Normally, it is located on throttle body.</p> <p>b) Air Temperature Sensor</p> <p>Answer:</p> <p>The air temperature sensor is used to measure the temperature of the incoming air in the engines air stream. The sensor is used by the computer to measure air density for fuel mixture control. The computer uses this information to change the air/fuel ratio according to the air density. Normally, it is located on intake manifold.</p> <p>c) Oxygen Sensor</p> <p>Answer:</p> <p>The Oxygen sensor is a device positioned in the exhaust manifold/ stream. Oxygen sensor, measures the make-up of the exhaust whether it is running too lean or too rich.</p> <p>d) Throttle Position Sensor</p> <p>Answer:</p> <p>The purpose of the throttle position sensor/switch is to relay the position of the throttle butterfly valve to the ECU. Normally, it is located on throttle body.</p> <p>e) Vehicle Speed Sensor</p> <p>Answer:</p> <p>Normally, the vehicle speed sensor is located on transmission box/ gear box housing. The vehicle speed sensor (VSS) measures transmission/transaxle output or wheel speed. The ECM uses this information to modify engine functions such as ignition timing, air/fuel ratio, transmission shift points, and to initiate diagnostic routines.</p>	1*4=4										

Q.25	<p>Ram Complained to the technician that the cranking motor of his car keeps of running even after release of starting switch. Give the possible causes and their remedies. (any 4)</p> <p>Answer:</p>		1*4=4
	Possible Causes	Remedies	
	Sticky starting switch	Repair or replace starting switch	
	Solenoid switch contacts points sticky	Check and service or replace if required	
	Short circuit in wiring harness	Check wiring, repair fault after locating it	
	Pinion bush seized on shaft	Check and service or replace bush	
Pinion flywheel gear fouled or damaged	Clean thoroughly; deburr gear and pinion or replace if required.		