

D (7)

SCORING INDICATORS – VERSION B

COURSE: AUTO ELECTRICAL AND ELECTRONIC SYSTEMS

CODE : 4052
Version: 2015

Qn No	Scoring Indicators	Split Score	Total Score
PART A 1	The active material on positive plates is nickel hydroxide. On negative plates, it is cadmium oxide on nickel-cadmium cell.		2
2	In series motor, field and armature are in series; which means armature and field currents are the same. This motor produces high initial torque, thus it is more suitable as starter motor.		2
3	The function of a condenser is to 1. Avoid arcing and pitting of CB point 2. To intensify spark		2
4	Normally the contact breaker gap should be between .4mm to .5mm.		2
5	Requirement of a headlight for automobile is that these should illuminate the road ahead with a reasonable distance with sufficient intensity.		2
PART B 1	Charging Procedure 1. Check the electrolyte level in the battery 2. Connect the positive and negative terminals to the respective terminal of the battery charger 3. Adjust the value of charging current 4. Keep a watch over the temperature of the electrolyte 5. Record the specific gravity and temperature hourly 6. In case several batteries have to be charged simultaneously, the same may be connected in series In quick rate charging method, a high charging current (as high as 100A) is used till the battery comes to about 80% of charge level. The remaining charging process is finished by slow rate method.	Procedure=3 Method=3	6

<p>2</p>	<p>Open circuit voltage of a battery is measured with the help of a sensitive voltmeter. If the car has been recently driven or the battery has been just charged, the surface charge must be removed from the battery by running on the head lights for one minute, turning off and waiting for about 2 minutes. Then with the engine and all electrical accessories shut off, connect the voltmeter to the battery terminals.</p> <table border="0"> <tr> <td>VOLTMETER READING</td> <td>CONDITION</td> </tr> <tr> <td>12.6V</td> <td>FULLY CHARGED</td> </tr> <tr> <td>12.2V</td> <td>½ DISCHARGED</td> </tr> <tr> <td>11.9V OR BELOW</td> <td>FULLY DISCHARGED</td> </tr> </table> <p>Voltage of the Cell = Specific Gravity +0.840</p>	VOLTMETER READING	CONDITION	12.6V	FULLY CHARGED	12.2V	½ DISCHARGED	11.9V OR BELOW	FULLY DISCHARGED	<p>Method=4 Value=2</p>	<p>6</p>
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12.6V	FULLY CHARGED										
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<p>3</p>	<p>Voltage Regulator This unit works on the principle of electromagnetic switch and its contact points keep on vibrating resulting in not building up of high voltage in the system. In this unit the points remain closed with the help of the spring and when the armature develops high voltage, these points open, inserting a resistor in the circuit.</p> <p>Current Regulator This is fitted to safeguard against developing high current in the armature. When the current value increases beyond set value, the contact point of current regulator opens thus disconnecting the circuit.</p>	<p>3 mark each</p>	<p>6</p>								
<p>4</p>	<ul style="list-style-type: none"> • The factors affecting the size of the motor depends upon <ol style="list-style-type: none"> 1. Torque required at the crankshaft 2. Crankshaft speed required to start the engine 3. Speed ratio between the starting motor and crankshaft • Starting torque depends on piston displacement per cylinder, number of cylinders and the compression pressure. • For low compression engines, a 12V starting system is used and for high compression engines, 24V starting system is required since the current load on battery will otherwise be extreme. 	<p>3 mark each</p>	<p>6</p>								
<p>5</p>	<p>Since it takes certain time called ignition delay to start the combustion after the spark, it is clear that the spark must occur prior to the moment at which maximum pressure is desired. The difference between this moment and the occurrence of spark plug in terms of degrees of crankshaft rotation is termed as ignition advance.</p> <p>Automatic ignition advance methods</p> <ol style="list-style-type: none"> 1. Centrifugal Advance 2. Vacuum Advance 	<p>Def=4 Methods list=2</p>	<p>6</p>								
<p>6</p>	<p>There are three general methods of aiming headlights.</p> <p>In the first type the vehicle is arranged to stand on level ground at about 8m from a vertical white screen on which the head light pattern can be studied. The tyres of the vehicle should be inflated properly as per specifications and vehicle should carry the correct load. Each upper beam is adjusted separately after throwing it separately on the white screen. The headlights are provided with vertical and horizontal adjusting screws with the help of which the aiming can be adjusted. One head light is covered while the other being adjusted.</p> <p>The second type does not require much space. In this case, a series of prisms and reflectors are used which throw an accurate miniature pattern of the headlight beam on a miniature screen only about 30 cms from the headlight. The screws or nuts of the mounting bracket must be turned or loosened in order to allow the swinging of the light up or down, or from one side to the other. For the vehicles provided with separate sets of headlights for the low and high beams, separate adjustments should be made for each headlight.</p> <p>The third type makes use of an optical headlight beam setter. This is a precise adjustment device with the help of which the alignment can be made easily. Moreover it does not require much space for carrying out the alignment.</p>	<p>2 each (outline only)</p>	<p>6</p>								

7	<ul style="list-style-type: none"> Some horns require relatively heavy currents. If they are operated directly with the horn button, the contacts are likely to get pitted, affecting the operation of the horn. To avoid this, a device known as "horn relay" is fitted in the circuit. With this device, the switch is used only to supply current to the horn relay windings and the current supply to the horn is affected through the relay contact. This way a current of about 9-12 A at 12 V is carried through the relay contacts and a small amount of about 3-5 A through the horn button circuit. 	3 mark each	6
III A	<p>Container Battery container are of single piece of construction and are of made either hard rubber or polypropylene. There are partitions inside the container, which divide it into compartments for different cells .At the bottom of each compartment there are bridges formed on which the battery palates rest.</p> <p>Plates There are two types of battery plates, the positive and the negative. For each plate there is a supporting frame work or grid made of an alloy of lead and antimony..The active materials in the positive plate grid is lead peroxide (PbO₂) and in negative spongy lead (Pb). A no: of positive plates are lead burnt to a post strap to form a positive plate group, while the negative plate group contains one plate more than the positive group so that both sides of the positive plates can be utilized on which greater electron chemical activity takes place.</p> <p>Separators To avoid direct contact and thus short circuiting of positive and negative plates, thin sheets of some non-conducting materials are inserted between them. These sheets are called separators. These are made from treated wood, ebonite, sintered PVC. The materials of the separators must be sufficiently porous or perforate to allow diffusion of acid.</p> <p>Cell cover Cell cover provides a ceiling for the cells. Each cell cover contains holes for the positive and negatives posts, a vent and filler openings. The vent allows the gases produced during battery charging to escape and are provided in the plugs to cover filler openings which are also used to check specific gravity of electrolyte. Cell covers are sealed in the container to form a leak proof joint.</p> <p>Electrolyte Electrolyte used in lead acid battery is a solution of sulphuric acid. It contains approximately one part of sulphuric acid, 2 parts of water by volume. Specific gravity of the electrolyte is kept under consistent observation to have a proper watch over the state of the battery.</p>	Names=3 Explanation=1 mark each	8
III B	<p>Advantages of the alkaline battery over the lead acid type are:</p> <ol style="list-style-type: none"> 1) Alkaline battery is lighter than lead -acid battery. 2) It is mechanically very strong & can stand very rough use. 3) The rate of charging can be much higher in case of alkaline battery. 4) The discharge rate when left standing is very low as compared to Lead acid type, since the active materials are insoluble in the electrolyte . Therefore the battery has got much longer shelf life. 5) Comparatively longer life (10-15 years) 	Any 4	7
IV A	<p>Rating of a battery is determined by the current it can produce and the time for which it can sustain this current</p> <p><u>20 Hour Rate</u> It represents the rate of current a battery can deliver continuously for 20 hours after which the cell voltage should not drop below 1.75v</p> <p><u>20 Minute Rating</u> It represents the rate of current a battery can deliver continuously for 20 minute after which the cell voltage not dropping below 1.5v</p> <p><u>Reserve Capacity</u> It is the time in minutes for which the battery can supply 25 Amperes at 25°C without the cell voltage falling below 1.75v</p>	2 mark each	8