

# CBSE | DEPARTMENT OF SKILL EDUCATION

## AUTOMOTIVE (SUBJECT CODE 804)

CLASS XI (SESSION 2021-2022)

MARKING SCHEME

SECTION A

(3 + 2 = 5 marks)

Answer any 03 questions out of the given 04 questions		1 x 3 = 3
Q.1	<b>Innovative Entrepreneurs.</b>	1
Q.2	Fabian entrepreneurs are very shy, lazy, and cautious. These entrepreneurs doesn't venture or take risk.	1
Q.3	The full form of NAPCC is <b>National Action Plan on Climate Change.</b>	1
Q.4	National Green Tribunal ( <b>NGT</b> )	1
Answer any 01 question out of the given 02 questions		1 x 2 = 2
Q.5	The entrepreneurs who are technical by nature in the sense of having the capability of developing new and improved quality of goods and services out of their own knowledge, skill and specialization are called a technical entrepreneur. They are essentially compared to craftsmen who concentrate more on production than marketing.	2
Q.6	This mission aims to clean up Indian cities, towns, and villages. One of its main aims was to achieve an open-defecation free India by October 2, 2019, the 150th anniversary of the birth of Mahatma Gandhi, by constructing toilets across the country.	2

SECTION B

(5 + 6 + 6 = 17 marks)

Answer any 05 questions out of the given 07 questions		1 x 5 = 5
Q.7	Generally, after every <b>10,000 – 15,000 kilometres</b> or <b>once in a year</b> the gear oil required to be replaced.	1
Q.8	<b>Bearing grease</b> is used to lubricate the wheel bearing as well as wheel hubs periodically.	1
Q.9	To improve the life of the tyre treads and to reduce the un-even tyre wear, periodically (approximately every after 5000 kilometres) the tyre rotation is necessary.	1
Q.10	<b>Aspect Ratio:</b> This term describes the relationship between a <b>tyre's cross-sectional width</b> and its <b>sectional height</b> . This usually expressed in percentage.	1
Q.11	The hydraulic brake system works on the <b>Pascal's Law</b> . Pascal's law states that " <b>The confined liquid transmits pressure intensity equally in all directions</b> ".	1
Q.12	The procedure of <b>removing trapped air</b> from the hydraulic brake system is called <b>bleeding of brake system</b> .	1
Q.13	<b>Power assisted brake booster</b> is the component incorporated in the hydraulic brake system of heavy motor/ commercial vehicles to increase the pressure applied by the driver.	1

Answer any 03 questions out of the given 05 questions		2 x 3 = 6
Q.14	<p><b>Adjustment of Clutch Pedal Free Play for Heavy Vehicles:</b></p> <p>The procedure of adjustment depends on the make of vehicle. The clutch pedal free play for 4 – wheeler is generally kept as 15 -20 mm. If the free play is less or more it is to be adjusted in the adjusting unit (Turn buckle with locknuts) provided with the clutch linkage.</p> <ol style="list-style-type: none"> <li>1. Loosen the lock nuts provided both side of the turn buckle.</li> <li>2. Rotate the turn buckle with the help of spanner to the required direction to adjust the play.</li> <li>3. After achieving the required play at the pedal tighten both the lock nuts of turn buckle.</li> </ol>	2
Q.15	<p><b>Procedure of changing gear box oil:</b></p> <ol style="list-style-type: none"> <li>1. Run the vehicle for few kilometres and park it on a hard level ground.</li> <li>2. Place a container below the drain plug to drain the old oil.</li> <li>3. Remove the drain plug and filler plug and leave it for some time till the complete old oil is drained.</li> <li>4. Replace the drain plug with new washer and tighten with specified torque.</li> <li>5. Fill the gearbox with new oil of correct quantity and grade and close filler/Level plug.</li> </ol> <p>NOTE: When the oil starts flowing out through the filler plug/ level plug it means gear box is filled with correct quantity of oil.</p>	2
Q.16	<p><b>Requirements of Automobile Wheels:</b></p> <ol style="list-style-type: none"> <li>1. To take the vehicle load, wheels with tyres gives a cushioning effect.</li> <li>2. It must cope up with the steering system or it should take side thrust /cornering effects and also withstand driving thrust (able to transmit power at specified loads).</li> <li>3. It should be light in weight so that the unsprung weight is least.</li> <li>4. It should be assembled and disassembled easily.</li> </ol>	2
Q.17	<p><b>Maintenance of Tyres and Tubes:</b></p> <ol style="list-style-type: none"> <li>1. Clean the tyres regularly with water and suitable cleaning solvent.</li> <li>2. Check for uneven tyre wear and uneven treads.</li> <li>3. Check air pressure of tyre at regular interval and it should be maintained at the specified pressure given by the manufacturer.</li> <li>4. Remove small chips of stone trapped in tyre treads with the help of nose plier.</li> <li>5. Tyre rotation should be done periodically as per the manufacturer's instructions.</li> </ol>	2
Q.18	<p><b>Adjustment of Brake shoe clearance:</b></p> <ol style="list-style-type: none"> <li>1. Brake shoe clearance to be adjusted with the help of adjustment units provided one for leading shoe and another for trailing shoe, in each wheel brake plate (back Plate) which have hexagonal head for fixing the spanner while adjusting.</li> <li>2. There are two inspection holes each for leading and trailing shoes. The feeler gauge can be inserted through the inspection holes to measure the clearance between the wheel drum and the brake shoe.</li> </ol>	2

<b>Answer any 02 questions out of the given 04 questions</b>		<b>3 x 2 = 6</b>
<b>Q.19</b>	<p>For easy shifting of gears, it is necessary to regularly lubricate the gear linkages. Slackness must be inspected and adjusted otherwise it may cause either hard gear engagement or gear slips out of mesh. To avoid this problem, the alignment of following parts to be checked and adjusted.</p> <ol style="list-style-type: none"> <li>Gear lever with gear rod excessive play is adjusted by using thrust washer, by adding thrust washer in the gear lever casing.</li> <li>Check the gear rod spring and lever ball for wear.</li> <li>Gear shifter fork should align with the shifting sleeve on the main shaft of respective gear. If alignment is improper, loosen the fork bolt and adjust.</li> <li>Check the synchronizing ring with the synchronizing cone and with fixed hub mounting on the main shaft.</li> <li>Inspect the internal and gear teeth for nick formation, polish the same for solving the problem.</li> <li>In case of Motor cycle, tighter the gear shifter lever, if it has slackened.</li> </ol> <p>After the necessary adjustments go for driving test. All the gears should be engaged and dis engaged smoothly with smooth transmission of power.</p>	<b>3</b>
<b>Q.20</b>	<p><b>Procedure of removing wheel from the Stub axle:</b></p> <ol style="list-style-type: none"> <li>Park the vehicle on hard level ground and chock the wheels with wooden blocks to lock the wheels.</li> <li>Loosen the wheel nuts with the help of wheel spanner.</li> <li>Lift the particular wheel and clear the ground with the help of jack by placing it under the axle.</li> <li>Remove the grease cup with the help of hammer and screw driver.</li> <li>Remove the split pin after straightening it.</li> <li>Unscrew the castle nut and take it out.</li> <li>Remove the brake drum from stub axle</li> <li>Remove the wheel and wheel hub from stub axle.</li> </ol>	<b>3</b>
<b>Q.21</b>	<p><b>Advantages of Tubeless Tyres:</b></p> <ol style="list-style-type: none"> <li>The tubeless tyres are lighter and run cooler than the tubed tyres.</li> <li>The main advantage of tubeless tyre is that it retains air for comparatively longer time period even after being punctured by nail, provided the nail remains in the tyre. But the tubed tyre releases the air immediately after being punctured.</li> <li>With the tubeless tyre the vehicles can run for around 50 kms. or more even the tyre is punctured.</li> <li>Any hole in the tubeless tyre can be repaired simply by rubber plugging.</li> <li>It can be re-treaded in the same manner as the tubed tyre.</li> </ol>	<b>3</b>
<b>Q.22</b>	<p><b>Overhauling of Master Cylinder:</b></p> <ol style="list-style-type: none"> <li>After removing the master cylinder from the brake system it should be thoroughly cleaned.</li> <li>With the help of circlip plier remove the locking ring provided for locking the master cylinder piston.</li> <li>Remove the retaining plate, master cylinder piston along with piston return spring, primary cup, secondary cup and valve assembly.</li> <li>After removing all components clean properly in hydraulic fluid and inspect all the parts for their serviceability.</li> <li>If required, replace the complete master cylinder kit (Primary and secondary cups, piston return spring and valve assembly).</li> <li>While assembling all the parts ensure that they are smeared with the fresh brake fluid.</li> <li>Replace the retaining plate, locking ring and dust cover.</li> </ol>	<b>3</b>

**SECTION C**  
**(COMPETENCY BASED QUESTIONS)**

**(2 x 4 = 8 marks)**

<b>Answer any 02 questions out of the given 03 questions</b>		
<b>Q.23</b>	<p><b>Steps for Adjusting the Wheel Bearing/Wheel Play</b></p> <ol style="list-style-type: none"> <li>1. Before adjusting the wheel play, ensure that the bearing is properly cleaned, inspected.</li> <li>2. Now take the fresh bearing grease and fill it from broader side of taper roller bearing and ensure grease reaches to the opposite side of the wheel.</li> <li>3. Fill the grease in the hub.</li> <li>4. Change the outer and inner grease seals of bearing.</li> <li>5. Now fix the bearing on the axle shaft with spacer.</li> <li>6. Place washer and tighten the castle nut.</li> <li>7. Check the wheel by turning.</li> <li>8. If there is friction, loosen the castle nut.</li> <li>9. Check again for friction, wheel should roll freely.</li> <li>10. Lock the castle nut with the use of split pin.</li> <li>11. Fit the grease cup by filling with new grease.</li> <li>12. Remove the jack and wooden blocks by lowering it down.</li> </ol> <p><b>Precautions:</b></p> <ol style="list-style-type: none"> <li>1. Over filling the grease in Centre of the hub is not advisable, as it will flow out due to heat and may go in brake drum.</li> <li>2. Oil seal should be replaced if required.</li> <li>3. To allow the free movement of wheel without any play, the castle nut should be first tightened followed by loosening it by a quarter or half thread till the wheel rotate without any friction.</li> <li>4. Castle nut must be locked by placing proper sized split pin.</li> <li>5. Grease cup should not be overfilled.</li> </ol>	<b>4</b>
<b>Q.24</b>	<p><b>Steps for repairing of Punctured Tube:</b></p> <ol style="list-style-type: none"> <li>1. Loosen the wheel nuts.</li> <li>2. Raise the portion of punctured wheel by placing the jack at lift point.</li> <li>3. Remove the punctured wheel from hub.</li> <li>4. Keep the removed nuts safely with washer</li> <li>5. By using tube valve, release the remaining air from the tube</li> <li>6. Place the blunt lever to remove the tyre bed from the wheel or place the wheel on the tyre removing machine.</li> <li>7. Take out the tube gently by supporting the tube valve.</li> <li>8. Inspect the inner portion of tyre and check for pointed items, remove with the help of nose plier.</li> <li>9. Fit the valve back in the tube and fill the air. Check for leakage by placing the tube in water container.</li> <li>10. Mark the punctured area from where air is coming out.</li> <li>11. Dry off the punctured tube and rub the punctured place with fine grade emery paper/rasp/rubber file.</li> <li>12. Apply the cold patch adhesive solvent on and around the puncture area and allow it to dry for few minutes.</li> <li>13. Take out the cover from the cold patch and place centrally on the punctured portion of the tube in mini press unit and press the cold patch</li> </ol>	<b>4</b>

	<ol style="list-style-type: none"> <li>14. After repairing the puncture, again fill the air and check forleakage.</li> <li>15. Before fitting back tube in tyre, apply white powder (French- chalk powder) inside the tyre.</li> <li>16. Fit tyre back on wheel rim and see that this is fitted properly other wise use the tyre removing machine.</li> <li>17. Fix wheel back on the hub.</li> <li>18. Diagonally tighten the nut with specified torque.</li> <li>19. Fill the air of recommended pressure</li> <li>20. Remove the jack by lowering it.</li> </ol>	
Q. 25	<p><b>Bleeding of Hydraulic brake systems Materials and instruments required:</b></p> <ol style="list-style-type: none"> <li>1 Glass jar, fresh hydraulic fluid, flexible plastic pipe of ½ meter length which can be fixed to the bleeding nipple.</li> <li>2 Double ended spanner of size 10mm</li> <li>3 Dry cotton waste.</li> </ol> <p><b>Important points</b></p> <ol style="list-style-type: none"> <li>1 If the bleeding nipple is provided with the master cylinder that should be bled first before proceeding to bleed other wheels.</li> <li>2 The sequences of bleeding points for right hand drive vehicle are as follows: <ol style="list-style-type: none"> <li>(a) Master Cylinder (if bleeding nipple provided)</li> <li>(b) Left rear wheel</li> <li>(c) Right rear wheel</li> <li>(d) Left front wheel</li> <li>(e) Right front wheel</li> </ol> (i.e, the farthest wheel from the master cylinder to be bled, after cylinder bleeding and nearest to be bled at last)</li> </ol> <p><b>Procedure of bleeding</b></p> <ol style="list-style-type: none"> <li>(i) Park the vehicle on hard level ground put the hand brake (parking brake) pulled.</li> <li>(ii) Start the engine and run it for some line to build up the air pressure if the hydraulic brake system is assisted by compressed air (air assisted hydraulic)</li> <li>(iii) Let one person sit on the driver's seat to operate brake pedal and let other person carry out the bleeding operation of different points one by one according to the sequence of mentioned above.</li> <li>(iv) Connect the flexible pipe of the bleeding nipple and other end of the pipe should be placed in glass jar to preserve the bled fluid while bleeding air from the system.</li> <li>(v) Ask the person who is sitting on the driver's seat to pump the brakes pedal numbers of times till it becomes hard to press but the brakes pedal to be kept in fully pressed position.</li> <li>(vi) Loosen the bleeding screw and you will be find air bubbles coming out through bleeding nipple.</li> <li>(vii) Number of times same procedure may be repeated till fresh flow of fluid at a pressure coming through the nipple.</li> <li>(viii) During every repetition the bleeding nipple should be closed and opened when the signal comes from the driver that he pumped and pressed.</li> <li>(ix) After every operation of bleeding, check the level of brake fluid in the reservoir.</li> <li>(x) Run the vehicle and check the brake effectiveness.</li> </ol>	4