CBSE|DEPARTMENT OF SKILL EDUCATION
AUTOMOTIVE (SUBJECT CODE-804)

MARKING SCHEME FOR CLASS XII (SESSION 2025-2026)

Max. Time: 3 Hours **Max. Marks: 60**

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of **24 questions** in two sections–Section A & Section B.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. **Out of the given (6+18=) 24 questions, a candidate has to answer (6+11=) 17 questions in the allotted (maximum) time of 3 hours.**
5. All questions of a particular section must be attempted in the correct order.
6. **SECTIONA-OBJECTIVE TYPE QUESTIONS (30 MARKS):**
    i. This section has 06 questions.
    ii. There is no negative marking.
    iii. Do as per the instructions given.
    iv. Marks allotted are mentioned against each question/part.
7. **SECTIONB–SUBJECTIVE TYPE QUESTIONS (30 MARKS):**
    i. This section contains 18 questions.
    ii. A candidate has to do 11 questions.
    iii. Do as per the instructions given.
    iv. Marks allotted are mentioned against each question/part.

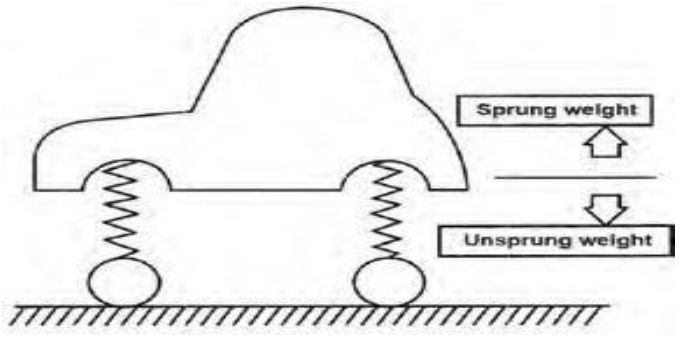
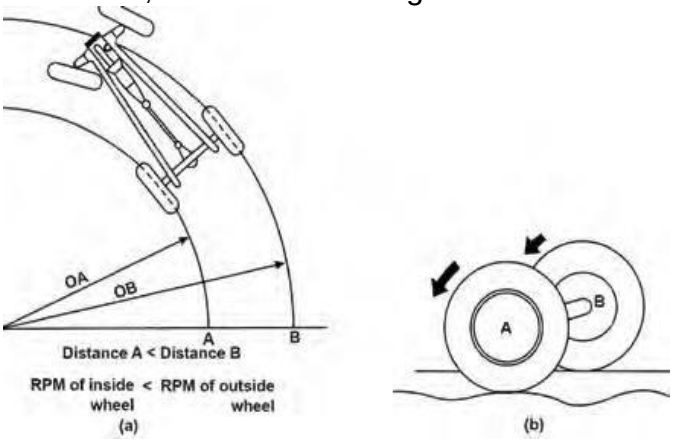
SECTION A: OBJECTIVE TYPE QUESTIONS

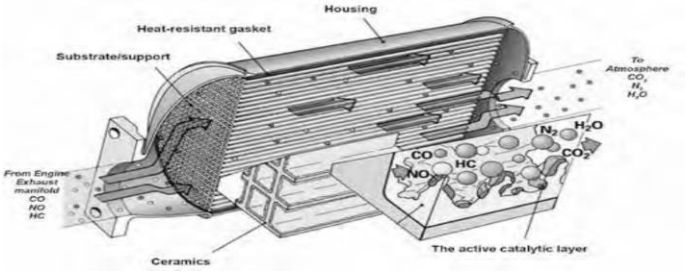
Q. No.	QUESTION	Source Material (NCERT/PSSCIVE/CBSE Study Material)	Unit/Chap. No.	Page no. of source material	Marks
Q.1	**Answer any 4 out of the given 6 questions on Employability Skills. (1 x 4 = 4 marks)**				
i.	(d) All of the above	NCERT	1/1	2	1
ii.	(a) The children	NCERT	1/3	22	1
iii.	(d) All of the above	NCERT	2/3	38	1
iv.	Ctrl+U	NCERT	3/3	57	1
v.	(c)Cell	NCERT	3/1	43	1
vi.	(b)Use air purifiers with HEPA filters	NCERT	5/1	118	1
Q.2	**Answer any 5 out of the given 7 questions (1 x 5=5)**				
i.	(c) Both a and b	CBSE	1.4	8	**1**
ii.	Garage	CBSE	1.2	5	**1**
iii.	Air pressure	CBSE	1.3	8	**1**
iv.	Amount	CBSE	1.2	5	**1**
v.	(c) Either a or b	CBSE	1.3	7	**1**
vi.	(d) All of the above.	CBSE	1.5	9	**1**
vii.	(d) 2 years	CBSE	6.1.6	130	**1**
Q.3	**Answer any 6 out of the given 7 questions (1 x 6=6)**				
i.	(a) 0 – 2°	CBSE	2.3	17	**1**
ii.	Toe-out	CBSE	2.3	17	**1**
iii.	(c) 3°	CBSE	2.3	18	**1**
iv.	0 to 6 mm	CBSE	2.3	20	**1**
v.	20:1	CBSE	2.4	22	**1**
vi.	(c) Rack and Pinion	CBSE	2.4	22	**1**
vii.	6 months	CBSE	6.1	122	**1**
Q.4	**Answer any 5 out of the given 6 questions (1×5=5)**				
i.	(d) Spring steel	CBSE	3.2	34	**1**
ii.	(c) Allow the leaves to slide during the bump movement	CBSE	3.3	40	**1**
iii.	(c) Centre bolt	CBSE	3.6	49	**1**
iv.	(a) Swinging shackle	CBSE		49	**1**
v.	“nip”	CBSE	3.4	41	**1**
vi.	sprung weight	CBSE	3.3	36	**1**
Q.5	**Answer any 5 out of the given 6 questions (1×5=5)**				
i.	(c) 20°	CBSE	4.3	53	**1**
ii.	Greater	CBSE	4.4	61	**1**
iii.	Final	CBSE	4.1	61	**1**
iv.	It is the propeller shaft that serves to transmit the drive force generated by the engine to the axles.	CBSE	4.3	53	**1**
v.	camber	CBSE	3.4	40	**1**
vi.	(d) All of the above	CBSE	6.2	134	**1**
Q.6	**Answer any 5 out of the given 6 questions (1×5=5)**				
i.	Sine	CBSE	5.4	79	**1**
ii.	Shunt-wound	CBSE	5.4	80	**1**
iii.	TIRRIL	CBSE	5.4	83	**1**
iv.	Direct Current	CBSE			**1**
v.	(d) All of the above	CBSE	6.1	131	**1**
vi.	Positive Crankcase Ventilation	CBSE	6.3	143	**1**

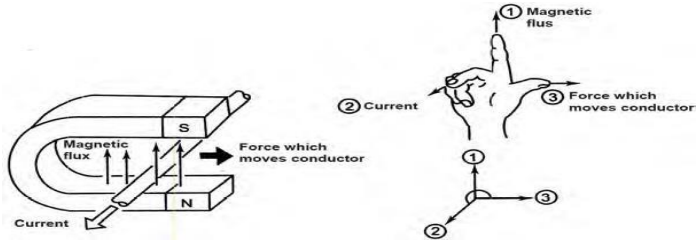
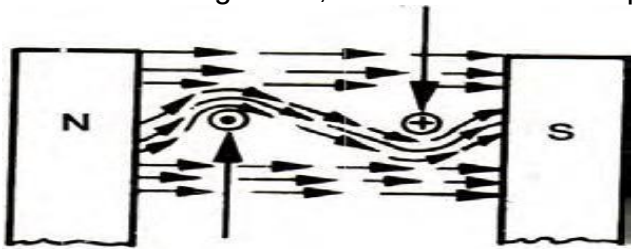
SECTION B: SUBJECTIVE TYPE QUESTIONS

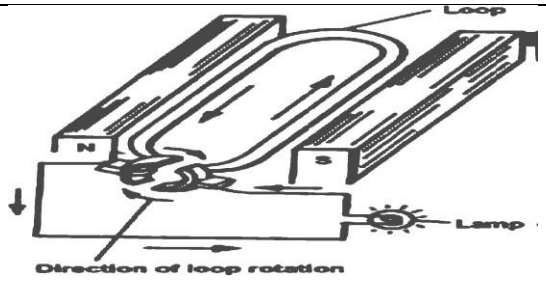
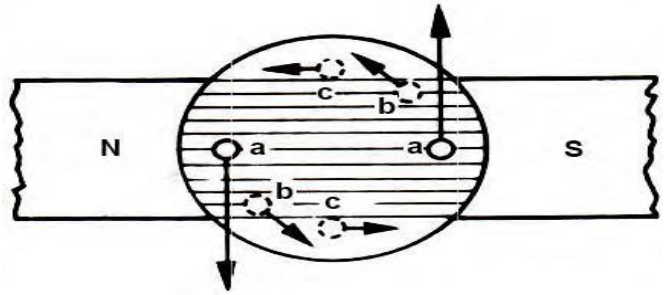
Q. No.	QUESTIONS	Source Material (NCERT/ PSSCIVE/ CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
	Answer any 3 out of the given 5 questions in 20–30 words each (2x3=6marks)				
Q.7	Motivation is derived from the word 'motive'. Thus, directing behavior towards certain motive or goal is the essence of motivation. An individual's motivation may come from within (intrinsic motivation) or be inspired by others or events (extrinsic motivation).	NCERT	2/1	24	**2**
Q.8	"An economic process, where an idea is generated or an opportunity is created, refined, developed and implemented, while being exposed to uncertainty to realise a profit by effective utilisation of resources".	NCERT	4/1	79	**2**
Q.9	Attitudes of an entrepreneur: **DECISIVENESS** Ability to make quick and profitable decisions. **TAKING INITIATIVE** Ability to take charge and act in a situation Before others. **ORGANISATIONAL SKILLS** Ability to make the optimum use of time, energy and resources to achieve the desired goals. **INTERPERSONAL SKILLS** Ability to work with others. **PERSEVERANCE** Ability to continue to do something, even when it is difficult.	NCERT	4/3	91	**2**
Q.10	The greenhouse gases are Carbon dioxide, Methane, Nitrous oxide, ozone and chlorofluorocarbons (CFCs). These are emitted due to burning of fossil fuels, using vehicles and refrigerants, and carrying out Agricultural activities, etc. These gases can trap heat from the earth and prevent it from escaping into outer space. This causes the earth to heat, leading to 'global warming'. To reduce the emission of greenhouse gases, people are working towards reducing the use of fossil fuels by finding less polluting energy sources, such as Compressed Natural Gas (CNG).	NCERT	5/2	119	**2**
Q.11	Steps to start LibreOffice Impress 1. First, you must ensure that LibreOffice Impress is installed on your computer. 2. Type 'LibreOffice Impress' in the search bar of Windows.	NCERT	3/5	64	**2**

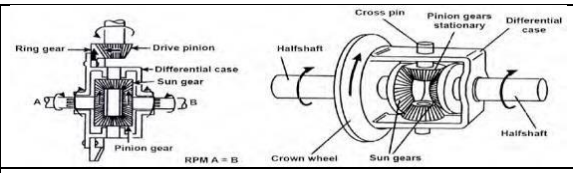
	3. Select LibreOffice Impress from the search results. 4. LibreOffice Impress will open. Cancel the 'Select a template' dialog box. 5. A blank presentation will open.				
	Answer any 3 out of the given 5 questions in 20–30 words each (2x3=6marks)				
Q.12	Positive-displacement compressors: Positive-displacement compressors work by forcing air into a chamber whose volume is decreased to compress the air. Common types of positive displacement compressors are: • Piston-type air compressors • Rotary screw compressors • Vane compressors	NCERT	1.1	2	2
Q.13	Emissions are any kind of substance released into the air from natural or human sources — flows of gases, liquid droplets or solid particles. Not all emissions become air pollutants, but many do, causing significant health and environmental problems. The amount of air pollutants in an area depends on the number and size of emission sources, along with the weather and lay of the land. 1. Point sources 2. Area sources	NCERT	6.3	141	2
Q.14	**Advantages** 1. The power steering system reduces the number of turns of the steering wheel required to move it from lock to lock. 2. Easy steering while parking, at low speeds or tight turns. Major Components are : 1. Pump 2. Control Valve 3. Power Cylinder 4. Fluid Reservoir	NCERT	2.6	26	2
Q.15	**Sprung and Un-sprung Weight:** The **sprung weight** refers to the weight which is supported by the suspension springs. The weight of the vehicle's body, frame, engine, transmission, interior, fuel, and passengers constitute the sprung weight. The **un-sprung weight** refers to the weight which is not supported by the suspension springs i.e. Weight of the components between the springs and road surface. The un-sprung weight includes the weight of wheels, axles, steering linkage, and some suspension components. It may be noted that un-sprung weight should be kept as low as possible to achieve a pleasant ride.	NCERT	3.3	36	2

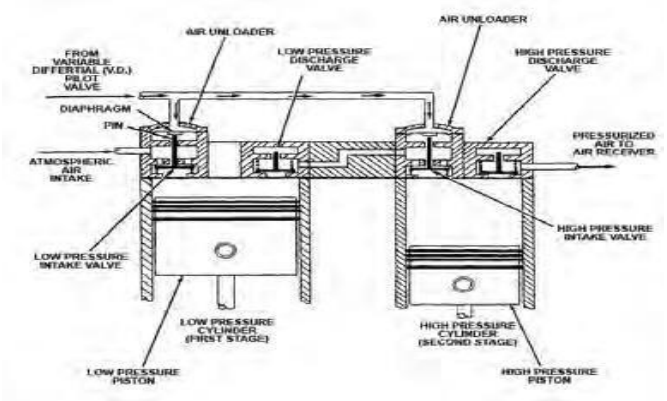
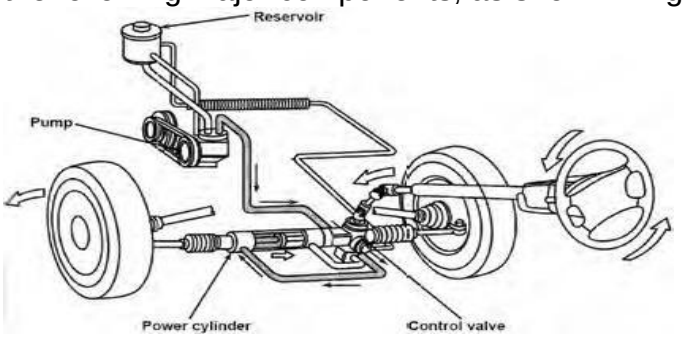
	 **Fig. Sprung and Un-sprung Weight**				
Q.16	The functions of propeller shafts are: • To transmit torque • To allow different drive shaft angles • To allow changes in length • To reduce rotary vibrations	NCERT	4.2	53	2
Answer any 2 out of the given 3 questions in30–50 words each (3x2=6marks)					
Q.17	When a vehicle is moving rounding a corner, the turning radii of inner and outer wheels differ. It may be noted that a difference also exists in the distance travelled by the inner and outer wheels. As both sets of wheels complete the corner in the same period of time, it follows that their respective speeds will also differ. The differential is responsible for generating this difference of speed in inner and outer Wheels. If the left and right wheels are connected directly without differential, turning would not be possible unless One of the wheels started to slip. Thus, cornering in such a condition would be extremely difficult and would also result in an increased amount of tyre wear. Thus, in simple works, differential is a mechanism by means of which outer wheel runs faster than the inner wheels while taking a turn or moving over upheaval road. The differential consists of a system of gears arranged in such a way that connects the propeller shaft with the rear axles. The differential is a part of rear axle housing assembly, which includes differential, rear axles, wheel and bearings.  **Fig: Principle of Differential**	NCERT	4.5	62	**3**

Q.18	**Advantages of Alternators over Dynamo:** 1. For same output, the alternator is much smaller in size as compared to a dynamo. 2. For the same current output the alternator is lighter 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. No cut-out unit is required in the alternator. The maximum driving speed of the alternator is comparatively higher (20000 rpm) than the dynamo (9000 rpm). 7. Alternator requires a smaller size of driving pulley as compared to dynamo.	NCERT	5.4	88	**3**
Q.19	**Catalytic Converter:** Catalytic converters provide another way to treat the exhaust gas. These devices located in the exhaust system, convert harmful gases into harmless gases. Inside the catalytic converter, the exhaust gases Passover a catalyst. A catalyst is a material that promotes a chemical reaction without being affected by the reaction. In effect, the catalyst encourages chemicals to react with each other. Converter systems with both oxidation and reduction catalysts are called 2 stage or 3-way catalytic converter systems. The three-way catalytic converter is the most ideal type of catalytic converter since it can convert not only CO and HC, but also NOX into non-polluting substances. Some of the newest converters have even started to use gold mixed with the more traditional catalysts. Gold is cheaper than the other materials and could increase Oxidation, the chemical reaction that reduces pollutants, by up to 40 percent. The oxidizing converter handles HC and CO, using platinum or palladium as the catalysts. The air helps the oxidizing catalyst convert the HC and CO into carbon dioxide and water. The reducing converter handles NOX using metal rhodium. It splits oxygen from the nitrogen. The NOX becomes harmless nitrogen (N2) and Oxygen (O2)  **Fig: Sectional view of Catalytic Converter**	NCERT	6.3	145	**3**

Answer any 3 out of the given 5 questions in 50–80 words each (4x3=12 marks)					
Q.20	**Principle :** When a conductor is placed between a U – shaped permanent magnet and moved in the direction as shown in the figure (a), electromotive force (e.m.f) is induced in the conductor and an electric current occurs in the conductor in the direction as shown by arrow. The direction of magnetic lines from the permanent magnet, the direction of the movement of the conductor and the direction of induced electric current follows the Fleming's right-hand rule which states that when the thumb forefinger and middle finger of the right hand are Positioned right angle to each other, as shown in the figure (b), then the thumb points the direction of the force which moves the conductor, the forefinger points the direction of the magnetic lines and the middle finger indicates the direction of induced electric current. The principle of DC generator is further elaborated by considering the action taking place in two conductors moving through a magnetic field in opposite direction, as shown in the fig.(b), current induced will be in the opposite directions, as indicated there.  **Fleming's Right Hand Rule** Figure c, shows these two conductors formed into a loop. The ends of the loop are connected to two segments of a commutator. Two brushes have been provided at the segments to take off the current generated in the loop. When the loop is rotated in the clockwise direction as shown in the fig.(c), the current will flow through the commutator segments, brushes and the lamp.  Fig (b) Distortion	NCERT	5.4	78	4

	 fig (c)Simple generator of magnetic field x`due to movement of two conductor. When the loop is rotated through 180°, the two sides of the loop will change position without affecting the direction of the current flow since the commutator segments also change positions.  Fig (d) Conductors at various positions with respect to magnetic field. Fig (d) shows the three different positions a, b and c of the coil. When the conductors are moving parallel to the field the induced voltage in the coil is zero and maximum when moving at right angles to the field. The induced voltage depends upon the rate at which the conductors cut the magnetic lines of force. As seen from fig.(d), the conductors at position c are moving parallel to the field and hence them induced voltage is zero since they are not cutting the lines of force. The induced voltage in each conductor at any time is proportional to sine θ, where θ is the angle between the direction of motion and the magnetic field. Hence, the voltage induced in the coil will follow a sine wave.				
Q.21	**Operation** • **Straight Ahead Travel:** The rolling resistances of the two drive wheels are almost identical when the vehicle is travelling straight ahead on a level road. When resistance is equal in both axle shafts, the differential pinions themselves do not rotate but turn as a unit with the ring gear, differential case and pinion shafts. In this case, the differential pinions only function to connect the right and left sun gears. As a result, the two sun gears rotate as a unit with the revolution of the pinion gears, causing both drive wheels to turn at an equal rpm. Fig. Operation of Differential while vehicle moving on straight ahead.	NCERT	4.5	64	**4**

					
Q.22	**Telescopic Shock Absorber** • **Construction** This is formed by two concentric tubes, the inner tube being the pressure cylinder and The outer a reservoir for hydraulic fluid a piston and a piston rod assembly work in the cylinder. A valve assembly is fitted in the bottom of the cylinder and abuts a cap welded to the lower end of the reservoir. The top piston rod passes through an oil seal in a cap welded to the top of the reservoir. The top piston rod passes through an oil seal in a cap welded to the top of the reservoir tube. The top of the piston carries a further cap to which is attached a dust cover. Rubber bushed mounting eyes are welded to the top and bottom caps. The piston is drilled with too rings of holes, the outer ring controlled by a spring loaded flap valve, the inner ring is controlled by another flap valve backed by a support ring a helical spring abutting a shouldered nut which retains the piston and valves on the piston rod. In the lower end of the pressure cylinder is the valve assembly. The valve body has a large central hole and a ring smaller hole. A spring-loaded recuperation valve is fitted over the large over the large central hole and spring discs cover the ring of smaller holes.	NCERT	3.4	45	**4**
Q.23	Working principle of Air Compressor : 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. 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. 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. 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. Unable to store pressurized air, a type of antique air compressor may be found in the blacksmith's foundry bellows.	NCERT	1.1	4	**4**

	Now the air compressor is capable of building extreme pressures in storage tanks capable of storing enormous amounts of pressurized gases for industrial use.  Fig: Two Stage Reciprocating Air Compressor				
Q.24	**Hydraulic Power Steering System:** The hydraulic power steering, as discussed above, is the system having a hydraulic booster that reduces the force required to operate the steering wheel. **Components** The hydraulic power steering system consists of the following major components, as shown in fig.  1. **Pump:** It generates hydraulic pressure. 2. **Control Valve:** It switches the oil passage to the power cylinder according to the rotational direction of the steering wheel. 3. **Power Cylinder:** It moves the piston in the cylinder to the right or left with hydraulic force and thereby assists the steering wheel operation. 4. **Fluid Reservoir:** The power steering fluid reservoir stores fluid and cleans it using a built-in filter.	NCERT	2.6	27	**4**