

**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No .	Sub Q. N.	Answer	Marking Scheme
1		Attempt any FIVE of the following:	10
	(a)	Define the terms (i) Fare (ii) Gross Vehicle	02
	Ans	(i) Fare It means the sum payable for a daily or seasonal ticket in respect of the hire of a contract or Stage carriage (ii) Gross vehicle weight: The total permissible weight carried by the vehicle. This weight includes material stress, the permissible axle load and maximum loads set by the manufactures.	Each term 1 mark
	(b)	Explain the meaning of Taxation.	02
	Ans	Taxation: Taxes in India are levied by the Central Government and the state governments. Some minor taxes are also levied by the local authorities such as the Municipality. A Tax is nothing but a compulsory contribution to nation.	
	(c)	Write documents required to obtain permanent driving license.	02
	Ans	Documents required for getting Permanent Driving License- I. Application for a driving license in Form 4. II. Following documents should be attached with Form 4 - 1. Learner's license, 2. Appropriate fee for the test of competence to drive and issue of license, 3. Three copies of the applicant's recent passport size photograph 4. Medical certificate in Form 1-A,	02 Marks



		5. Proof of age (copy of any one) i. School Leaving Certificate (LC) ii. SSC Board Certificate iii. PAN card, 6. Proof of address (copy of any one) i. Electricity Bill ii. Telephone bill iii. Election Voters ID card 7. Driving school's certificate in Form 5 for all transport vehicles, 8. All valid documents of the vehicle on which the test to be conducted (Registration Certificate, Insurance Certificate, Tax Card, PUC Certificate, Fitness Certificate in case of Transport Vehicle)	
	(d)	Name the types of Bookings.	02
	Ans	Following types of booking used in transport management. 1. To Pay at Destination: In this type of booking the party has to pay the cash and take delivery. 2. Paid: In this type, party to pay the freight charges in advance. 3. Billing: In this type, party has to pay the charges on submission of bills. There are five copies of a goods consignment notes for consignee copy, consigner copy, driver's copy, head office copy for accounts and office copy. 4. Online Payment: Payment through Internet banking in advance or after the delivery of consignment.	
	(e)	State any two advantages of smart card.	02
	Ans	1) Smart cards can provide identity documentation, authentication, data storage, and application processing. 2) Smart cards may provide strong security authentication for single sign-on (SSO) within large organizations. 3) Easy to carry. 4) Smart cards are made up from durable material.	02
	(f)	Write full forms of PCRA and CIRT.	02
	Ans	1) PCRA: Petroleum Conservation and Research Association 2) CIRT: Central Institute of Road Transport	02
	(g)	Write types of PERMIT.	02
	Ans	Types of Permits. (any two – 02 marks) 1. Stage carriage permit 2. Contract carriage permit 3. Private service vehicle permit 4. Goods carriage permit 5. National permit 6. All India Tourist permit	02
2		Attempt any THREE of the following	12
	a)	Differentiate between S.T.A. and R.T.A.	04



	Ans	<p>Answer:</p> <table border="1"> <thead> <tr> <th data-bbox="269 365 347 438">NO</th> <th data-bbox="347 365 857 438">STA</th> <th data-bbox="857 365 1349 438">RTA</th> </tr> </thead> <tbody> <tr> <td data-bbox="269 438 347 478">1.</td> <td data-bbox="347 438 857 478">It is the State Transport Authority</td> <td data-bbox="857 438 1349 478">It is Regional Transport Authority</td> </tr> <tr> <td data-bbox="269 478 347 625">2.</td> <td data-bbox="347 478 857 625">STA gives effect to directives issued under section 67 to control road transport by state government through the state</td> <td data-bbox="857 478 1349 625">RTA decides the policies to control road transport as per the directives of STA through the state.</td> </tr> <tr> <td data-bbox="269 625 347 737">3.</td> <td data-bbox="347 625 857 737">To coordinate and regulate the activities and policies of the regional transport authority.</td> <td data-bbox="857 625 1349 737">To fix the fares for auto-rickshaw,taxis from time to time throughout the region</td> </tr> <tr> <td data-bbox="269 737 347 810">4.</td> <td data-bbox="347 737 857 810">To conduct not less than two meetings in a year</td> <td data-bbox="857 737 1349 810">To conduct not less than six meetings in a year.</td> </tr> <tr> <td data-bbox="269 810 347 884">5.</td> <td data-bbox="347 810 857 884">Chairman-Transport secretary</td> <td data-bbox="857 810 1349 884">Chairman-Divisional/revenue commissioner</td> </tr> <tr> <td data-bbox="269 884 347 995">6.</td> <td data-bbox="347 884 857 995">Member-IG(police), chief engineer of PWD, few MLA's and two non-government representatives.</td> <td data-bbox="857 884 1349 995">Deputy, IG(police), superintending engineer of PWD, few MLA's and one non-government representatives</td> </tr> <tr> <td data-bbox="269 995 347 1106">7.</td> <td data-bbox="347 995 857 1106">Secretary-Transport commissioner or joint transport commissioner.</td> <td data-bbox="857 995 1349 1106">Secretary-Regional Transport officer.</td> </tr> <tr> <td data-bbox="269 1106 347 1218">8.</td> <td data-bbox="347 1106 857 1218">To consider application for grant, renewal or transfer of permit on interstate routes.</td> <td data-bbox="857 1106 1349 1218">To consider application for grant, renewal license of permit within the region</td> </tr> </tbody> </table>	NO	STA	RTA	1.	It is the State Transport Authority	It is Regional Transport Authority	2.	STA gives effect to directives issued under section 67 to control road transport by state government through the state	RTA decides the policies to control road transport as per the directives of STA through the state.	3.	To coordinate and regulate the activities and policies of the regional transport authority.	To fix the fares for auto-rickshaw,taxis from time to time throughout the region	4.	To conduct not less than two meetings in a year	To conduct not less than six meetings in a year.	5.	Chairman-Transport secretary	Chairman-Divisional/revenue commissioner	6.	Member-IG(police), chief engineer of PWD, few MLA's and two non-government representatives.	Deputy, IG(police), superintending engineer of PWD, few MLA's and one non-government representatives	7.	Secretary-Transport commissioner or joint transport commissioner.	Secretary-Regional Transport officer.	8.	To consider application for grant, renewal or transfer of permit on interstate routes.	To consider application for grant, renewal license of permit within the region	Any four points – 1 mark each
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	b)	What factors are to be considered while buying new motor vehicle.	04																											
	Ans	<p>Factors to be considered for buying new car are as follows</p> <p>a) Checkout the features and quality of new vehicle –</p> <p>i) Checkout the features offered and additional optional fittings, which suits your lifestyle.</p> <p>ii) Checkout the quality factors of new vehicle like mileage, fuel storage capacity, option of using alternative fuels like CNG/LPG, also safety features like airbags, antilock braking system etc</p> <p>b) Ex-showroom price and on road price-</p> <p>i) There is huge difference between on-road price and ex-showroom price.</p> <p>ii) Ex-showroom price is the basic price which does not include Insurance, RTO registration charges, extended warranty if any and sometimes the Municipality Road tax etc. After adding all these you will get on road price.</p> <p>c) Use of vehicle</p> <p>i) Select the vehicle on basis of for what purpose you are buying a new vehicle (Personal use, Commercial use, expected seating capacity etc.)</p> <p>d) Inspecting the vehicle</p> <p>ii) Before purchasing the vehicle inspect the vehicle for whether the features are as per your demands or not.</p>	<i>(any 04 points, 01 mark each)</i>																											



	<p>e) Gather expert reviews –</p> <p>i) Read expert comments and reviews on the vehicle, you are buying.</p> <p>ii) Do the comparative study with other same class of vehicles to checkout for added benefits.</p> <p>iii) Enquire about extended warranty as well as regular service contract.</p> <p>f) Test drive the vehicle –</p> <p>i) Analyse and be sure that the vehicle has characteristics that you are looking for.</p> <p>ii) Inspect and feel carefully all the interior and exterior such as bonnet, of vehicle.</p> <p>iii) Checkout your vehicle thoroughly including braking, electrical, steering system etc before driving at home.</p> <p>g) When and where to buy</p> <p>i) Vehicles prices hike up and down often, Ex- Showroom price & tax applicable can also varied as per location hence it's important to decide when and where to buy a vehicle.</p> <p>h) Closing the deal –</p> <p>Vehicles prices hike up and down often, so negotiate the price of the vehicle. Remember the Actual price of the car may be far less than the Advertised price so bargain as much as possible.</p>	
c)	Describe the procedure of survey and valuation of vehicle.	04
Ans	<p>Steps involved in preparation of accident survey report:</p> <p>Whenever an accident occurs all particulars have to be collected for purpose of preparing a report known as accident survey report. While applying for insurance claim to insurance company when the vehicle is met to an accident or damaged due to any natural calamity, an Accident survey report is required to be attached with application form. It is prepared by the surveyor appointed by the insurance company.</p> <p>1) Whenever an accident occurs all particulars have to be collected and ascertained as given below-</p> <p>a) General: Site, date and time of accident</p> <p>b) Registration no. of vehicle involved in accident</p> <p>c) Nature of Accidents - Collision with or avoidance of overturning or any other kind of accident.</p> <p>d) Primary Cause of accident - Fault of driver or pedestrian, defective road surface, other cause, unknown.</p> <p>e) Light condition- Daylight, dusk, dark with good street light, dark with no street light.</p> <p>f) Road condition- Straight, bend, intersection, flat, dry, wet, hill, concrete, earth road.</p> <p>g) Traffic condition- Dense/light/moderate traffic, controlled junction, uncontrolled junction.</p> <p>h) Responsibility of driver- Sex, age, driving experience, intoxicated, asleep or inattentive, Speeding.</p> <p>i) Responsibility of Pedestrian- Age, deaf, blind or otherwise walking on road, crossing or Running into road, intoxicated, confused by traffic, talking in roadways.</p> <p>j) Particulars of motor vehicle- Age of vehicle, overload, and defective brakes,</p>	



	<p>defective steering, puncture or burst, other serious mechanical defects.</p> <p>k) Casualties persons killed/ injured- Rider of motorcycle, passengers other than driver or rider, cyclist, pedestrian, not known. 2) Assess the quantum of loss.</p> <p>2) Determine the liability of the insurers within the framework of policy conditions.</p> <p>3) Negotiate with the insurer/advise the insurers regarding the disposal of salvage.</p> <p>4) Prepare the detail survey report and submit it to the insurer</p> <p>Procedure of Valuation: The process of determining the current worth of a vehicle is called as valuation. There are many techniques that can be used to determine value, such as subjective and objective</p> <p>1) Know the current market value of vehicle</p> <p>2) Calculate the depreciation of vehicle based on market value. for this consider –</p> <p>i) Make, Model and Variant e.g. Maruti Swift VDi</p> <p>ii) Month and Year of Manufacture e.g. July 2009</p> <p>iii) The city in which the car was registered.</p> <p>3) Calculate the depreciation of vehicle based on usage and aging.</p> <p>4) Analyze the mechanical condition and damage occurred with respect to Body, Chassis, and Aesthetics, Engine condition, vibrations, noise etc. 5) Consider the Tyre condition and decide tyre cost.</p>	
	<p>d) State the passenger amenities and infra structural facilities required.</p>	04
	<p>Following amenities and infrastructural facilities are to be provided in a bus stand :</p> <p>1. Waiting hall for passenger</p> <p>2. Rest room for passenger</p> <p>3. Canteen facility</p> <p>4. Drinking water</p> <p>5. Toilet and wash room</p> <p>6. Parking for two wheelers and four wheelers</p> <p>7. Cycle stand</p> <p>8. Mobile charging facility</p>	<p>(Any 8 points, each point carry 1/2 Mark)</p>
3	Attempt any THREE of the following	12
	<p>a) Discuss the basic factors considered in bus scheduling.</p>	04
	<p>Basic factors in bus scheduling-</p> <p>1) Traffic demand: Assessing the volume or traffic demand is essential in bus scheduling. Traffic survey should reveal traffic movement sector wise density, centripetal and centrifugal flow, peak and lean periods, competition from other modes of transport.</p> <p>Road survey helps to judge the feasibility of road operation. Route length, route condition, traffic points running time, fixation of bus stop.</p> <p>2) Run time:It is the time taken by a bus on a particular route. Depending upon the time taken for one trip, number of buses running on that route and their frequency can be decided.</p>	<p>(Any four-1 mark each)</p>

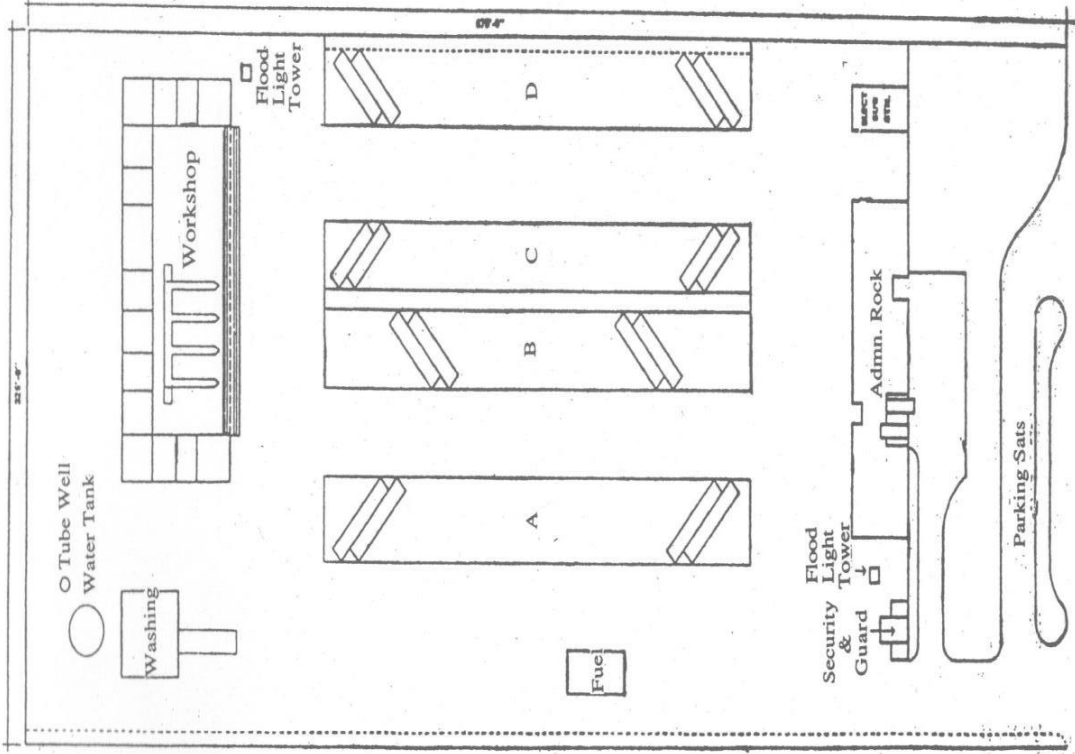


	<p>3) Stand time: It is called as layover time. It consist of time taken by passengers, to get in or get down the bus, to load or unload their luggage, time taken by the conductor to report to the controller, to give tickets to the passengers, cleaning of the bus etc.</p> <p>4) Maintenance time: It is time taken for the preventive maintenance of vehicle. It includes routine daily checks and greasing, washing, cleaning, topping up diesel etc.</p> <p>5) Vehicle Utilization: It is used to indicate the number of kilometers operated per vehicle per day.</p> <p>6) Requirement of buses: Calculate the number of buses required to be operated considering frequency of service for a maximum utilization of a bus.</p> <p>Number of vehicle = $\frac{\text{Running time}(\text{twice}) + \text{Stand time}(\text{Twice})}{\text{Service of Frequency}}$</p>	
b)	Explain the importance of automobile engineer in transport industry.	04
Ans	<p>An Automobile Engineer is the real technocrat in automobile as well as transport industry, so he is required to play an important role as a responsible person as follows-</p> <ol style="list-style-type: none">1. Automobile engineers as an authority have to perform different functions in the office of STA/RTA as licensing authority, registration authority, Taxation authority etc.2. In transport organizations, planning and scheduling various transport operations - Route Survey and trip planning, Scheduling of buses and Crews,3. To maintain different records and its analysis.4. Traffic analysis and control.5. To adopt new technology and to introduce various improvement programs in new generation vehicle.6. To try for different means of fuel economy.7. To try to make vehicle more attractive, more comfortable and more reliable.8. He is required to carry out the research and impart drivers training and road safety aspects.	<i>(Any four points, each carry 1 mark)</i>
c)	State the factors to be considered while buying a used car.	04
Ans	<p>Answer: Factors to be considered for buying a used car</p> <ol style="list-style-type: none">1) Tyres: the condition of tyres its life and nature of wear must be noted.2) Body: The condition of the body and paint must be checked.3) Battery: The condition of battery is also essential before valuation because its cost is also high.4) Rattling noise: Check noise level and its origin or source.5) Engine: Starting qualities, good pick up, low fuel combustion, power output must be checked on road test. Check also engine oil pressure. Exhaust smoke will also indicate the condition of cylinder and working parts.6) Running Condition: On the road test it is possible to know drive the mechanism such as clutch, gear box, universal joint, differential. The wear and tear can be seen on road test.7) Registration and Tax payment: The vehicle R.C. book must be checked. This will	<i>(any 8 points, each point carry ½ mark)</i>



	<p>indicate the model and year of manufacture and number of owners; the tax paid to the insurance, expiry date can also be seen.</p> <p>8) Make and Model, Year: This can be seen from R.C. book but with experience it is possible to indicate the number of years of service of vehicle.</p> <p>9) Number of Owners: From R.C. book it is possible to know the number of owners and type of persons who owned.</p> <p>10) Popularity of the make depending upon the public opinion market rates of the vehicles goes up and down</p>																																														
d)	<p>State the importance of following documents in transportation.</p> <p>i) Log-book</p> <p>ii) Vehicle Ledger.</p>	04																																													
	<p>Answer:</p> <p>1) Log Book: Each vehicle has a log book which contains the details about the running time for a trip and allied factors. The driver of motor vehicle fills or updates log book regularly. The data like the station, date, start time, stop time, idle time due to rest, maintenance, fuelling, loading and unloading of goods etc and total distance covered, are written in the log book by the driver. At the end of trip, the driver produces the log book along with other documents. The log book gives the clear picture about a trip. The log book records play an important role in deciding the routes, scheduling time-table and economy of goods transport. The format of log book is given below-</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Truck No:</td> <td colspan="4"></td> </tr> <tr> <td>Driver No:</td> <td colspan="4"></td> </tr> <tr> <td>Station</td> <td>Date</td> <td>Start time</td> <td>Stop time</td> <td>Running time</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Distance covered</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total time</td> <td></td> <td>Rest time</td> <td></td> <td></td> </tr> <tr> <td>Ideal time</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Drivers time</td> <td colspan="4"></td> </tr> </table> <p>2) Vehicle Ledger: The data obtained from Trip Operational Sheet (TOS) is posted in a ledger called a vehicle ledger. The trip is indicated by a trip number which is also known as T.O.S No. Additional columns are provided for gross profit before vehicle tax, depreciation and tyre cost. The balance of cash available is given in last column. Thus the vehicle ledger is collective record of the trips exposing the financial aspect of transportation.</p>	Truck No:					Driver No:					Station	Date	Start time	Stop time	Running time						Distance covered					Total time		Rest time			Ideal time										Drivers time					02 marks for each
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<p>Ans</p>	<p>a) Explain the significance of BVS Depot with lay-out. <i>(Suitable Explanation & Layout should get full marks)</i> Significance of Bus Depot: Bus depot has important roles for a region that chooses bus mode in their transport system. Bus depot development attracts many attentions in the world of real estate development as it is a fixed infrastructure and facility that involves considerable land-use, long term investment (site selection), resources and buildings. The bus depot carries acceptable overall costs for its public administration and public transport operator body, reaches the marked and brings social benefit for the community, with long time perspective. It is optimal for the important stakeholders that are related to the depot. For the owner of public transport (e.g. a county) and its transport operator body, sufficient capacity and optimal location is the desirable situation. It has good building and design with sufficient dimension and right facilities to accommodate people and buses activity continuously in short and long period.</p> 	<p>04</p> <p>Explanati on -2 Marks,</p> <p>Layout- 2 Marks</p>
<p>Ans</p>	<p>b) Describe the working of MSRTC. Maharashtra State Road Transport Corporation (MSRTC) is the state run bus service of Maharashtra, India with approx.16, 000 buses which ferry 7 million passengers daily on 17,000 routes. It is the third largest bus service provider in India and serves routes to towns and cities within Maharashtra and adjoining states. It employs the three tire system for maintaining their buses as Central Workshop, Divisional Workshop and Depots. The work distribution at different levels is as follows- i) Central Workshop-</p>	<p>04</p>






	<p>Body building work on new chassis is done in the 3 Central Workshops i.e. Pune, Aurangabad and Nagpur on Ashok Leyland and TATA chassis. The major activities carried out at central workshop are as follows</p> <ol style="list-style-type: none">Reconditioning of engine, gear box and differential,Work pertaining to major accidents,Body building, tyre re-treading, andWork pertaining to retrieval of spare parts etc are <p>ii) Divisional Workshop-</p> <p>MSRTC is having 32 Divisional Workshops located at the Divisional Headquarters wherein vehicle maintenance is carried out as follows.</p> <ol style="list-style-type: none">Six monthly docking.RTO passing.Assembly overhauling.Accident Repairs. <p>iii) Depot:</p> <p>MSRTC is having 248 Depot Workshops for daily maintenance and running repairs of the buses. The main jobs carried out are as follows.</p> <ol style="list-style-type: none">Preventive Maintenance - Engine Oil Change, Running repairs, minor repairs etc.By-Monthly Docking	
c)	What is mean by third party Insurance and Comprehensive Insurance of vehicle.	04
Ans	<p>Answer:</p> <p>Motor vehicle Insurance is an agreement between the insurer and the insured wherein the insurer provides financial cover for the vehicle and the insured in return pays specific premium annually. It provides protection for your vehicle against the financial loss and liability that could result as a part of accident or theft. Following are the two types of vehicle insurance</p> <p>1) Comprehensive insurance - - It covers the risk of vehicle and its owner or driver as well as third party which involves in accident. Fire and theft cover is also provided against damage to the insured's vehicle. It does not include mechanical breakdown. The extent of comprehensive insurance may vary in detail from company to company. It is required to renew the policy annually, and it can be renewed two months in advance.</p> <p>2) Third Party insurance – It means the person or property other than the vehicle and vehicle owner are safeguarded under this insurance. It is compulsory to all vehicles to safeguard the interest of pedestrians. Personal injuries and personal vehicle damages will not be covered by this policy. For two wheelers, we can take this policy for life time. For other vehicles this policy has to be renewed annually.</p>	02 marks for each type
d)	Describe four cases where suspension of Registration of vehicle take place.	04
Ans		



	e)	Write general provision regarding construction and maintenance of motor vehicle	04
	Ans	<p>The Central government may make rules regulating the construction, equipment and maintenance of motor vehicles and trailers to all or any of the following matters namely,</p> <ol style="list-style-type: none">The width, height, length and overhang of vehicles and of the load carried,The size, nature and condition of tyres,Brakes and steering gear,Signaling appliances, lamps and reflectorsSpeed governorsThe emission of smoke, visible vapours, sparks, ashes, girt or oil,The reduction of noise caused by vehicles, <p>The embossment of chassis number and engine number and the date of manufacturing.</p>	
5		Attempt any TWO of the following	12
	a)	Describe the procedure of claiming compensation of accidental vehicles.	06
	Ans	<ol style="list-style-type: none">The person who are injured or whose property is damaged or nominee of the person who have got death are required to apply for compensation in appropriate form along with the duly filled discharge receipt and the undertaking to Claim Enquiry Officer of the district in which the accident have taken place within the period of six months from the date of accidentIn case of all major accident prefer spot survey. The surveyor will visit the workshop for inspection of the vehicle and finalization of the claim amount with the owner and / or repairer.Provide copies of the legal documents, viz FIR, Challans, postmortem report or certificate of injury to the insurance company for quick disposal of claim.The Claims Enquiry Officer decides who the right claimant is and submits a report in Form-III to Claims Settlement commissioner who issues the sanction order of the claim in Form IV to the insurance company.	06 Marks
	b)	Draw the sketch for following traffics signs <ol style="list-style-type: none">No EntryRailway Crossing (Guarded)No parking	06
	Ans	Anawer:	



	1	No Entry	
	2	Railway Crossing(Guarding)	
	3	No Parking	

c)	<p>What is registration mark? Give form and manner in which registration mark is displayed for</p> <p>i) Motor vehicle</p> <p>ii) Transport vehicle</p>	06
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Ans	<p>Registration mark: When vehicle is registered under Motor Vehicle Act, then a registering authority assigns a registration mark (Registration Number on number plate) to the vehicle. The owner of the vehicle is required to get painted the registration mark and affix to the vehicle as specified in motor vehicle act. The registration mark is issued by the registering authority will be valid throughout the India. Form and manner for display of registration mark:</p> <p>1. Motor cycle: The registration mark should be affixed on the front and rear side of the vehicle.</p> <p>2. Transport vehicle: The registration mark should be affixed on the front, rear as well as left and right side of the vehicle.</p>																					
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		5.	Minimum height of numerals	4.0 cm	9.0 cm	
		6.	Minimum thickness of numerals	0.7 cm	2.0 cm	
		7.	Minimum space between letter and numeral	0.5 cm	1.5 cm	
6		Attempt any TWO of the following				12
	a)	State the role of ARAI and VRDE with their full form				06
	Ans	<p>ARAI :Automotive research Association Of India:-</p> <ol style="list-style-type: none"> 1. ARAI is co-operative industrial research association by the automotive industry with the Ministry of Industries, Government of India. The ARAI is located in the western part of Pune, Maharashtra established in 1986. 2. The Role of the Association are to provide research & development in automotive engineering for industry, Product design and development, Evaluation of automotive equipment, Testing, Certification and Calibration services to the industry for developing safe, reliable and eco-friendly & user-friendly vehicles / components / products, Carry out test and calibration in accordance with stated methods and customer's requirements and to Harmonize Indian automotive standards to global standards 3. In order to meet the development requirements of Industry, several facility and competence build-up projects are completed. These are Engine Design/Simulation Software Installation, Development of bi-fuel CNG kits, new techniques and software capabilities in Noise, Vibration, Harshness Analysis, Vehicle Crash Analysis, VDACS software for chassis dynamometer control, Particulate Measurement System and Digitally Controlled Load Simulation. 4. ARAI is only automotive engineering R&D institute in India to be awarded ISO 9001 Quality System Certification. 5. ARAI is the first Indian institute to develop HCNG (Hydrogen blended CNG) fuel engine complying with EURO V standards for light commercial vehicles. (HCNG is greener than CNG and perceived as the ultimate alternative for fossil fuels. The engine has been developed for Tata Motors) <p>VRDE: Vehicle Research & Development Establishment</p> <p>Functions and role of VRDE:</p> <ol style="list-style-type: none"> 1. Its primary function is to help the defense and automotive industry regarding design, development, testing and certification of vehicle components. 2. To evaluate requirements of defense services as well as automotive industry. 3. The National Centre for Automotive Testing (NCAT), a separate division of VRDE, provides one stop solution to all vehicles testing (Laboratory as well as Road testing). 4. Development of specialist vehicles and systems for various roles including road mobile launchers and support vehicles for strategic missile programmes 5. Development of engines for unmanned aerial vehicles. 6. Development of light battle tank and systems for various combat roles. 7. Development of armoured wheeled vehicles and variants for various roles. 8. Development of systems and unmanned vehicles for nuclear, biological and 				03 marks for each



		chemical recycle and after-treatment. 9. Development of light unmanned aerial vehicles for low intensity conflict operations. 10. Development of multi feed gasification with poly generation technology. 11. Testing of military and commercial vehicles and engines for design validation and performance evaluation including emission tests	
	b)	Explain the meaning of Taxation with objectives.	06
	Ans	Taxation: Taxes in India are levied by the Central Government and the state governments. Some minor taxes are also levied by the local authorities such as the Municipality. A Tax is nothing but a compulsory contribution to nation. Objectives of taxation: 1. Raising the revenue of government. 2. Economical growth of state and nation. 3. Reduction in unemployment. 4. Reduction in regional disparities. 5. Distributional justice to all the people.	3 marks each
	c)	Explain vehicle schedule and Trip	06
	Ans	1. Vehicle scheduling: i) It is a trip or trips assigned to be performed by a bus during a day. ii) Vehicle schedule fixes the conditions of the vehicle operation on a route throughout the day. iii) Since the passenger low flow expresses the transport demand on the line for the entire day, bus schedule give a picture of the movement of vehicles on the route. Iv) iv) The important aim of a bus schedule is to satisfy the demand for transport combined with efficient use of vehicle resources. 2. Trip – i) It means the journey between two terminals i.e. from start of travel to the final destination for carrying passengers or goods on hire or reward. ii) It consists of assessment of running time and Standing time required during a single trip, considering the distance to be covered. iii) Maintenance time i.e. routine daily checks such as greasing, washing, cleaning, topping up diesel etc. should also considered in this.	3 marks each