SUMMER – 2022 EXAMINATION

Subject Name: Automobile Engineering **Model AnswerSubject Code:** **22656**

Important Instructions to examiners:

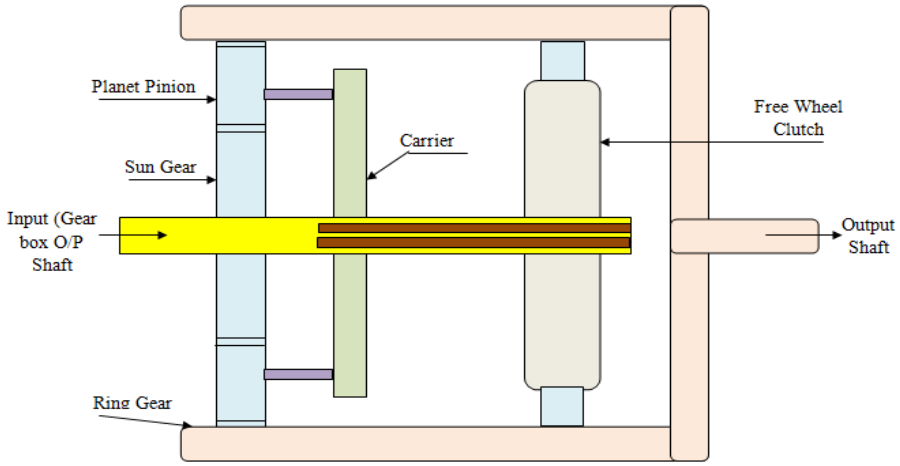
1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling 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.
8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students in first year (first and second semesters) write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

Q. No.	Sub Q. N.	Answer	Marking Scheme
1.		**Attempt any FIVE of the following: (5 x 2)**	**10**
	(a) **Ans.**	**Define Vehicle Layout.** **Vehicle Layout:** Layout means a systematic arrangement of different components or parts of a system, with their location and function. E.g. Layout or Plan of Building, House, Hotel, Industry, Hospital, Service Station/Garage/Workshop etc. Similarly, the Layout of Vehicle is nothing but, the systematic arrangement of different components, major assemblies of an automobile with their location and function.	**02**
	(b) **Ans.**	**State functions of clutch in automobile.** **Functions of Clutch in Automobile:** Clutch is a device used in transmission system of a vehicle to engage and disengage the engine to the transmission. Thus the clutch is located in between engine and transmission (gear box). The functions of clutch are stated as below; [1] To permit engagement or disengagement of a gear when the vehicle is stationary and the engine is running.	**02**

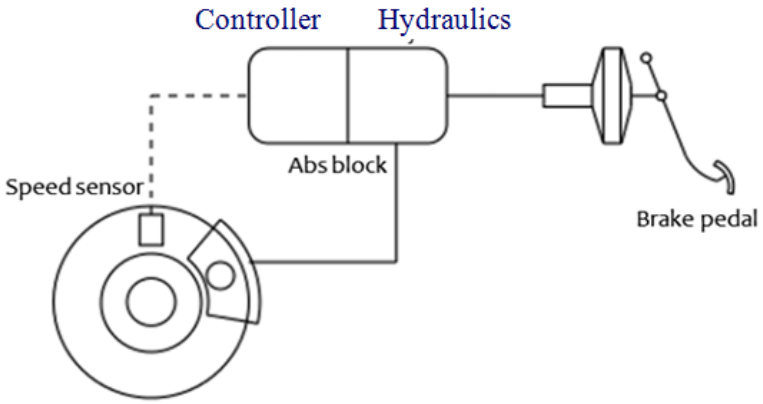
		[2] To transmit the engine power to the road wheels smoothly without shock to the transmission system while setting the vehicle in motion. [3] To permit the engaging of the gears when the vehicle is in motion without damaging the gear wheels. [4] To allow the engine to take up load gradually without shock or jerk. ***(Any 2 appropriate functions, 01 Mark for each)***	
	(c) **Ans.**	**State brake fade.** **Brake Fade:** With prolonged application of brakes, their effectiveness decreases. This is called fading of brakes.Brake fade happens when the braking system components no longer generate the friction needed to stop vehicle in an appropriate amount of time or distance.	**02**
	(d) **Ans**.	**Enlist any four requirements of suspension system in automobile.** **Requirement of Automobile Suspension System:** [1] It should provide minimum deflection. [2] It should be consistent and provide stability. [3] It should provide minimum wheel hop. *(wheels violently shake, vibrate and create noise)* [4] Low maintenance, operating and initial costs. [6] Minimum Weight. [7] Minimum tyre wear. ***(Any 04 appropriate requirements, 1/2 M for each)***	**02**
	(e) **Ans**	**Enlist any four electrical components of automobile.** **Automobile Electrical Components:** 1. Starting Motor 2. Alternator 3. Distributor 4. Ignition Coil 5. Lighting Systems 6.Electric Horn 7. Wiper 8. Gauges 9. Battery 10. Armature 11. Voltage regulator 12. Wiring 13. Fuse 14. Resistor 15. Capacitor etc. ***(Any 04 suitable electrical components, 1/2 M for each)***	**02**

	(f) **Ans.**	**State necessity of vehicle registration.** **Necessity of Vehicle Registration:** According to M V Act 1988, a person should not drive or no owner of a vehicle should allow the vehicle to be driven in public or private place, unless the vehicle is registered. Thus the basic objectives of Registration are; (i) To prove the ownership of the vehicle. (ii) To identify vehicle in the event of theft or accident of the vehicle.	**02**
	(g) **Ans.**	**State factors to be considered while selecting transmission.** **Factors to be considered while selecting transmission:** (a) Torque Transmission Capacity (b) Purpose, requirement or application (Manual, Semi or Fully Automatic mode) (c) Road Surfaces where vehicle to be drive (d) Road Resistances to be offered by vehicle (e) Load carrying capacity (Type of load) (f) Dynamic balancing (g) Gradual engagement (h) Easy in operation and maintenance (i) Inertia and Size ***(j)*** Strength, durability, aesthetic and ergonomics and cost. ***(k) (Any 04 suitable factors, 1/2 M for each)***	**02**
2.		**Attempt any THREE of the following: (3X4)**	**12**
	(a) **Ans.**	**Classify automobiles.** **Classification of Automobiles:** There are different ways of classification of Automobiles depending upon various parameters like; application/purpose, fuel used, load carrying capacity, engine location, body styles, drive used, engine location and power flow, no. of wheels and axles, type of transmission and suspension etc. **[1] According to Purpose/Use:**	**04**

		(a) Passenger Vehicle (b) Good's Carriage (c) Special Purpose Vehicle (d) Mopeds and Mokicks **[2] According to Fuel Used:** (a) Petrol Vehicle (b) Diesel Vehicle (c) Electric Vehicle (d) Gas Vehicle (e) Hybrid Vehicle **[3] According to Load Carrying Capacity:** **(**a) Heavy Motor Vehicle (b) Medium Motor Vehicle (c) Light Motor Vehicle **[4] According to Body Styles:** (a) Sedan (b) Hardtop (c) Lift back (d) Coupe (e) Limousine (f) Convertible (g) Estate Car (h) Sport Car (i) Station Wagon **[5] According to Drive used:** (a) Left Hand Drive (b) Right Hand Drive **[6] According to Engine Location and Power Flow** (a) Two wheel Drive (b) Four Wheel Drive **[7] According to Wheel and Axle:** (a) 2,3,4,6 Wheeler (b) 4 x 2, 4 x 4, 6 x 2, 6 x 4 Wheeler **[8] According to Transmission System:** (a) Conventional (b) Semi Automatic (c) Fully Automatic Transmission **[9] According to Suspension System Used:** (a) Conventional/Rigid Suspension (b) Independent Suspension: ***(Any 04 appropriate Categories, 01 Mark for each)***	
(b) **Ans.**		**Explain working of overdrive with neat sketch.** **Overdrive:** <u>Overdrive is a device used to step up the gear ratio in the car. It is fitted in between transmission and the propeller shaft</u>. This device helps the propeller shaft to rotate faster than the engine in a transmission. Overdrive is generally fitted on the top gear only. The overdrive may be operated either manually or automatically at a predetermined speed. **Overdrive consists of three major components i.e**. <u>(i) Freewheel Mechanism (ii) Planetary Gear Mechanism (iii) Control Mechanism</u> **Working of Overdrive:** When the sun gear is located with the casing, i.e. it becomes stationary, the speed of	**4** **1/2**

		the output shaft is increased i.e. overdrive is engaged. When however the sun gear is locked to the carrier or to the ring gear, solid drive through the gear train is obtained. Thus depending upon the locking of the sun gear with casing or with carrier the overdrive or the normal direct drive is obtained. There is another possible control of the mechanism, i.e. when the sun wheel is kept free to rotate on the input shaft. In this case, there is direct drive through the freewheel clutch when the engine develops power. However, when the accelerator pedal is brought to zero position and the engine is simply idling, the output shaft will tends to overdrive the input shaft.  **Figure: Constructional features of Overdrive** **(1/2 M for significance and construction of Overdrive, 1.5 M for appropriate working, 2 M for suitable labeled sketch)**	**1.5** **02**
(c) Ans.		**Explain working of ABS.** **Antilock Braking System:** Anti Lock Braking (ABS) System also known as Anti Skid Braking System is an automobile safety system which prevents the locking of wheels during braking and avoids uncontrolled skidding. It provides better control over the vehicle and decreases stopping distance on dry and slippery surfaces. **Working of ABS:** **[1] Speed Sensors:** Sensors used to calculate the acceleration and deceleration of wheel. It consists of toothed wheel and an electromagnetic coil or a magnet and a Hall Effect sensor to generate signal. **[2] Valves:** Each brake line which is controlled by ABS has a valve. This valve works on	**1/2** **1/2**

3 positions; *Position 1:* Valve remains open and pressure from master cylinder passes through it to brake. *Position 2:* Valve blocks the line and separates the brake from master cylinder *Position 3:* Some of the pressure from brake is released by valve.



[3] Pump: It is used to restore the pressure to hydraulic brakes after the valve releases the pressure.

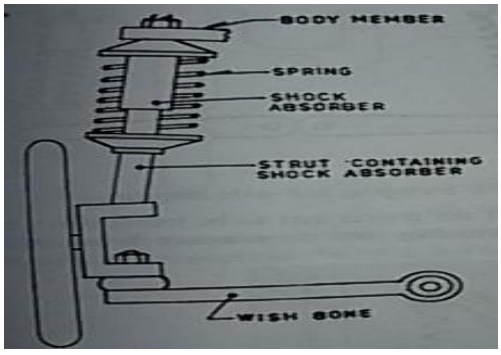
[4] Controller: Controller used in ABS is of ECU type. Its main function is to receive information from each individual wheel speed sensors and if a wheel loses its traction with the ground.

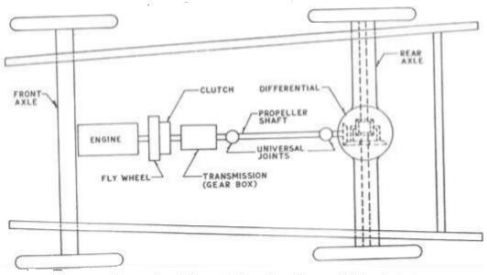
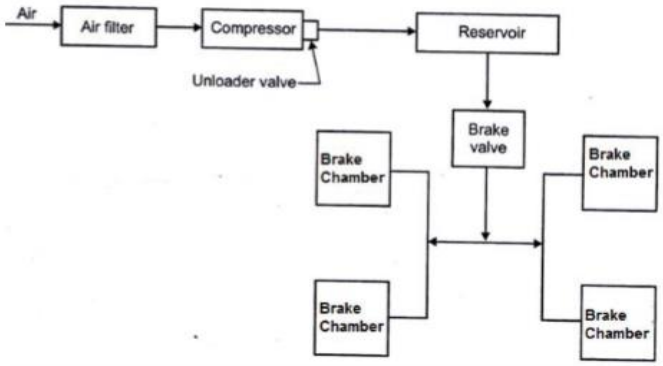
ECU reads the signal from each of the speed sensors of the wheel. As the brakes are suddenly applied by the driver, this makes the wheel to decelerate at faster rate and may cause the wheel to lock. As the ECU reads the signal which indicates the rapid decrease in the speed of the wheel, it sends signal to the valve which makes the valve close and the pressure to the brake pad reduces and prevents the wheel from locking. The wheel again starts to accelerate, again the signal sends to the controller, this time it opens the valve, increasing the pressure to the brake pad and brakes are applied, this again reduces the speed of the wheel and tries to make it stop.

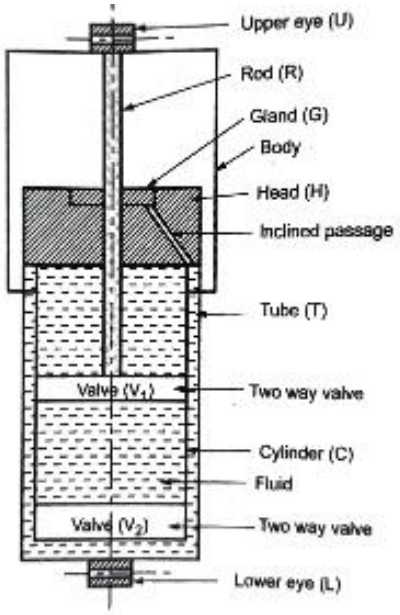
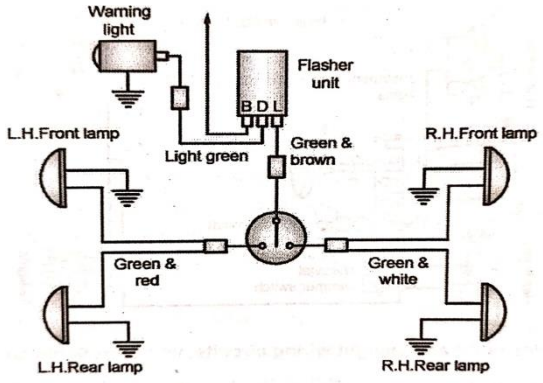
(1/2 M for Significance of ABS, 1/2 M for Constructional Features of ABS, 3 Marks for appropriate working with suitable sketch/block diagram/Line diagram.- *Figure is not necessary, Examiners must give appropriate weightage to proper technical description of working without sketch*)

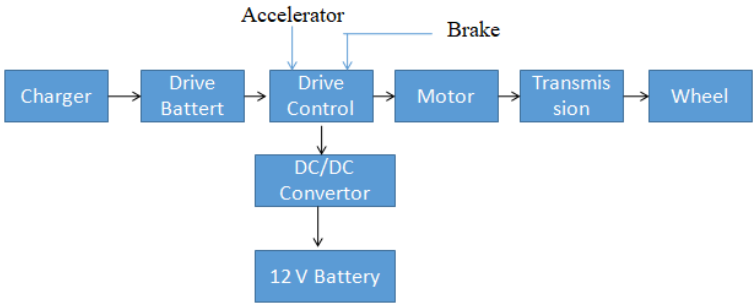
03

(3 Marks for appropriate working with suitable sketch/block diagram/Line diagram)

	(d)	**Describe the working of Mac. Pherson strut type suspension with neat sketch.**	**4**
	Ans.	**Mac Pherson Strut Type of Suspension:** A simple Macpherson Strut is a type of suspension that uses the top of a telescopic damper as the upper steering pivot. It is widely used in modern passenger cars. **Working of Mac Pherson Strut Type of Suspension:** In this, only the lower wishbones are used. A strut containing shock absorber and the spring carries also the stub axle on which the wheel is mounted. The wishbone is hinged to the cross member and positions the wheel as well as resists accelerating, braking and side forces. Internally, a strut is similar to a shock absorber. A piston is attached to the end of the piston rod and works against hydraulic fluid to control spring and suspension movement. Just like shock absorbers, the valving generates resistance to pumping forces created by the up and down motions of the suspension. This system is simpler than double wishbone type described above and is also lighter, keeping the unsprung weight lower. It is commonly used on front wheel drive cars. In India this system has been used in Maruti 800 cars.  **Figure: Mac Pherson Strut Type of Suspension** **(2 M for appropriate Working, 1.5 Mark for suitable sketch, 1/2 M for labeling)**	**02** **02** **(1.5 Mark for suitable sketch, 1/2 M for labeling)**

3		**Attempt any <u>THREE</u> of the following: (3X4)**	**12**
	(a)	**Draw and explain vehicle layout of front engine rear wheel drive.**	**04**
	Ans:	 **Figure: layout of Front Engine Rear Wheel drive** The layout of car is shown in the figure. It shows the position of the main parts of an automobile. It consists of engine located at the front of vehicle, followed by a clutch, gear box, propeller shaft, universal joint, differential, rear axle etc. The drive from the gear box is conveyed through a short shaft to the front universal joint of the propeller shaft. From the propeller shaft it is conveyed to the rear wheel through a sliding slip joint and universal joint. The bevel gear of the short shaft is driven by rear universal joint. This bevel gear meshes with a larger bevel gear which drives the two rear axle shafts through a differential gear.	**02 Marks for diagram** **02 Marks for Explanation**
	(b)	**Sketch the layout of air braking system. Explain its working.**	**04**
	Ans:	 **Fig Layout of Air braking system** **Air braking system:-** Compressor takes air from the atmosphere to the filter and the compressed air is sent to the reservoir through the unloaded valve ,which gets lifted at a predetermined reservoir pressure (900KPa) & relieves the compressor of load. From the reservoir the air goes to various accessories & also to the brake chambers located at each wheel. The control of brake valve is with driver who can control the intensity of braking according to the requirements. When pressure drops to 700 KPa, the governor again cuts in the compressor to raise system pressure. When air system pressure falls to 400 KPa, a warning in the form of a buzzer is sounded.	**02 Marks for diagram** **02 Marks for Explanation**

	(c)	**Sketch telescopic shock absorber and label main component**.	**04**
	Ans:		**Sketch=02** **Labelling-02**
	(d)	**Draw a labeled sketch of indicator light circuit and explain its working.**	**04**
	Ans:	 **Explanation:-**Now in modern vehicle flasher type direction indicator is used. These indicator are provided at front and rear of vehicle. An internal construction of a flasher unit is shown in Fig The current will flow through the main armature actuating wire, ballast resistors and the coil wound on the central core as well as through the flasher lamp filaments to the earth, when the direction indicator switch is moved either to the left or the right. The lamps are not allowed to get illuminated due to the current limitations but are kept to a low value by the ballast resistor The actuating wire will expand in length causing the armature to move inwards the core under the suspended spring tension due to heating influence of the current. Therefore, when the contacts are closed and lamp illuminated as flashing.	**02 Marks for diagram** **02 Marks for Explanation**

4		**Attempt any <u>THREE</u> of the following: (3X4)**	**12**
	(a) **Ans:**	**Explain working principle of electric vehicle.**  **Working Principle:-**Electric cars function by plugging into a charge point and taking electricity from the grid. They store the electricity in rechargeable batteries that power an electric motor, which turns the wheels. The battery used in electric car is lead acid battery or Sodium –sulphur type.The drive controller takes power from the batteries and delivers to motor.The drive controller consists of two variable resistors operated by accelerator pedal or brake pedal. Accelerator pedal signal send to drive controller through resistror to adjust the power to be delivered to the motor.	**4** Sketch= 02 Working Principle= 02
	(b) **Ans**:	**Explain construction and working of bendix drive.** Construction:- Main Components of Bendix drive are 1) Drive shaft 2) Spring 3) Pinion gear 4) Threaded sleeve **5)** Coller **Working of Bendix Drive:-**Bendix drive is an inertia based drive in which the pinion on the starter motor armature engages and disengages with the flywheel depending on the inertia of motor and flywheel. When the ignition switch is turned „ON", the starter motor armature starts spinning. This causes the sleeve to rotate while the pinion is stationary due to the unbalanced weight. The pinion hence moves axially towards the collar until it engages with the flywheel ring gear. Since the pinion cannot move further axially, its starts to rotate along with the sleeve thereby also rotating the flywheel. When the flywheel starts rotating at above 100 rpm the engine gets starts. After the engine has started the pinion gear is turned by the engine much faster than rotated by starting motor. This causes, the pinion gear to turn back on the threaded sleeve, making it disengaged with the flywheel.	**4** **Construction Working= 02Marks,** **Diagram= 02 Marks**

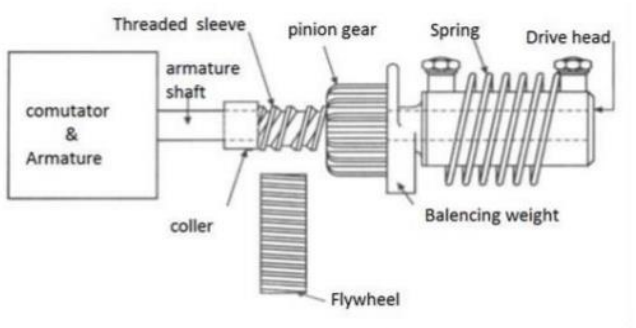


Figure: Bendix Drive

(Note: Equivalent credit shall be given to any other suitable sketch if drawn)

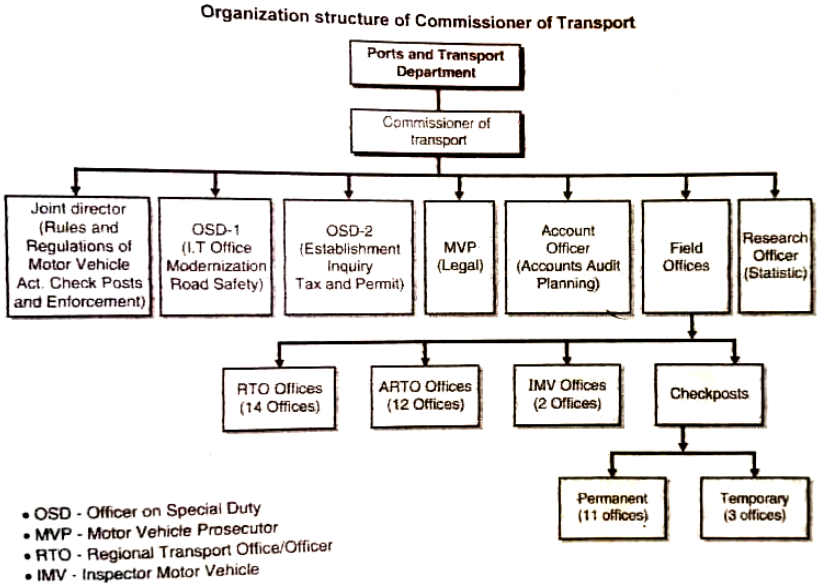
(c) **Describe organization structure of motor vehicle department (RTO).** **4**

Ans:

Organization Structure of Motor Vehicle (RTO) Department

The Transport department functions under the provisions of section 213 of Motor Vehicles Act, 1988. The Transport Department is primarily established for enforcement of the provisions of Motor Vehicles Act, 1988.

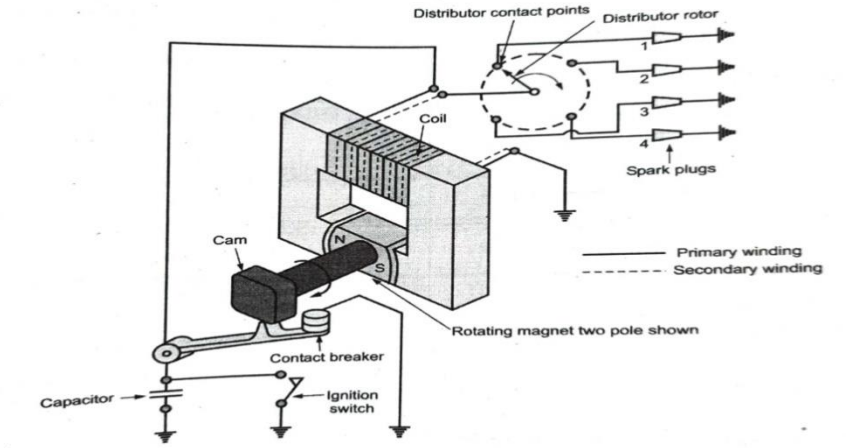
Motor Vehicles Act, 1989 and the rules framed under these two Acts. The Transport Department is headed by the Transport Commissioner (TC). He is assisted by Joint Director and OSD specializing in Enforcement, Administration and Finance in the Head office.



Figure=02

Description= 02

(Note: Equivalent credit shall be given to any other suitable structure)

	(d)	**Sketch circuit diagram for magneto ignition system.**	
	Ans:	**Answer :-** (Circuit Diagram 04 Marks)  **(Note: Equivalent credit shall be given to any other suitable sketch if drawn)**	**4**
	(e)	**Write Salient features of motor vehicles Act 1988**	**4**
	Ans:	**Introduction:-**Motor vehicle Act 1988 has 14 Chapter (217 Section) and two schedule. The first schedule gives various traffic signs, while in second schedule is given the compensation for third party fatal accident/injury cases claims. The Act cover following points. ● Licensing of drivers of motor vehicle. ● Licensing of conductors of stage carriages. ● Registration of motor vehicle. ● Control of transport vehicle. ● Special provision relating to stage transport undertaking. ● Construction, equipment and maintenance of motor vehicle. ● Control of traffic. ● Motor vehicle temporarily leaving or visiting India. ● Liability without fault in certain cases. ● Insurance of motor vehicle against third party risk. ● Claim tribunals ● Offences, penalties and procedure. **(Note: Equivalent credit shall be given to any other features)**	Any Four features 04 Marks

5		**Attempt any <u>TWO</u> of the following: (2X6)**	12
	(a)	Explain Constant mesh Gearbox with double declutching	6
	Ans:	- Diagram: -03 Marks Explanation: -03 Marks	

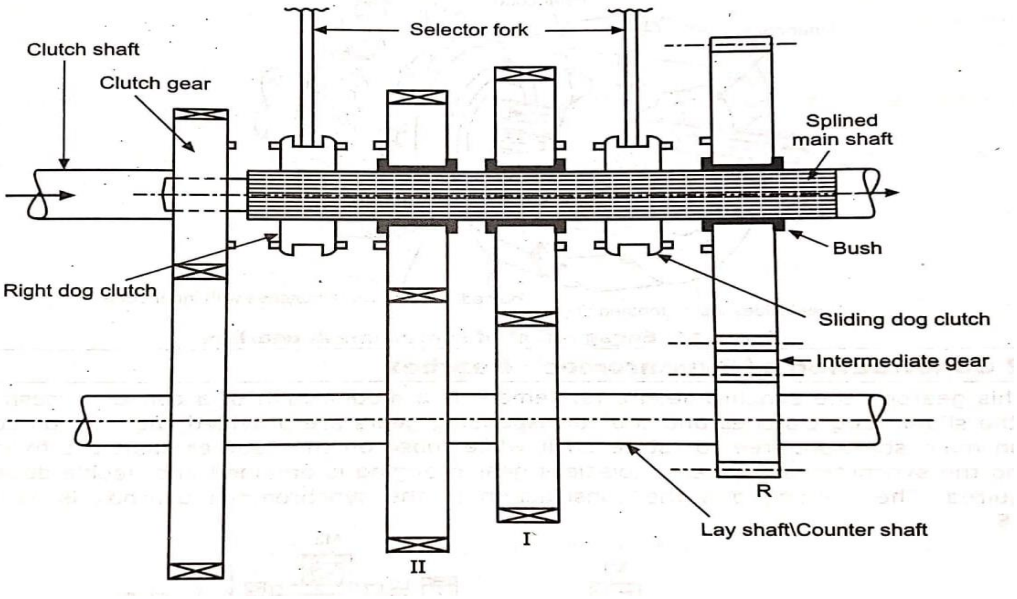


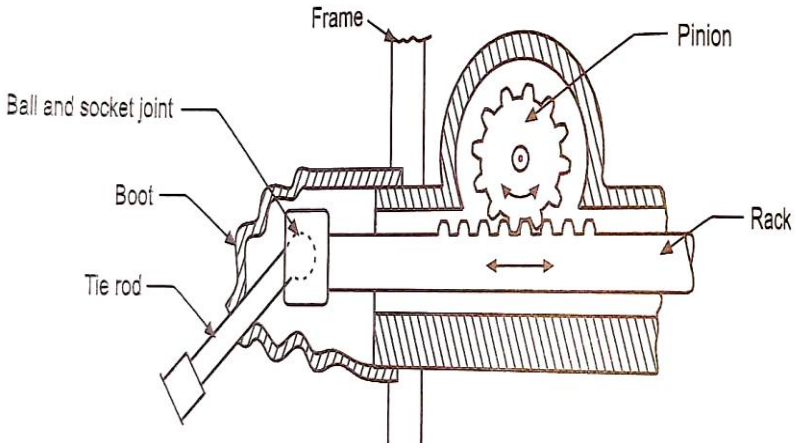
Fig.: - Constant mesh gear box.

Working: -The construction of constant mesh gearbox is similar to that of sliding mesh gearbox. Only difference is that in this type of gearbox, all the gears are in constant mesh with corresponding, gear on the lay shaft. The main shaft gears revolve freely on bushes, while the gears on the lay shaft are always fixed. There are splines on the main shaft and the dog clutches can slide freely on the main shaft with the selector fork.

When the right dog clutch slides to the left by means of the selector mechanism, its teeth are engaged with those on the low gear and we get the first gear. The same dog clutch however when slides to right, make contact with the reverse gear and thus reverse gear is obtained. Similarly, movement of the left dog clutch to the left results in direct gear and towards right in second gear.

Double declutching- In the constant mesh gear, if the dog clutches are to be engaged without grating then the speed of the main shaft gear and sliding dog must be equal. Therefore to obtain lower gear, the speed of clutch shaft, lay shaft and main shaft gear must be increased, and this is done by double declutching.

	(b)	Draw neat labelled sketch of rack and pinion steering gear and explain its working.	6
	Ans.	:-(Diagram: -03 Marks Explanation: -03 Marks)	



Working: Rack and pinion steering mechanism consists of 1. Rack 2. Tubular casing 3. Pinion 4. Track rod or Tie rod 5. Ball and socket joint 6. Adjusting screw

The rack-and-pinion steering box has a pinion, connected to the steering column. This pinion runs in mesh with a rack that is connected to the steering tie rods. Both the pinion and the rack teeth are helical gears. Helical gearing gives smoother and quieter operation for the driver. Turning the steering wheel rotates the pinion, and moves the rack from side to side. Ball joints at the end of the rack locate the tie-rods and allow movement in the steering and suspension. Mechanical advantage is gained by the reduction ratio. The value of this ratio depends on the size of the pinion. A small pinion gives light steering, but it requires many turns of the steering wheel to travel from lock, to lock. A large pinion means the number of turns of the steering column is reduced, but the steering is heavier to turn.

(c)

Ans.

Differentiate Between Tubed & Tubeless Tyre.

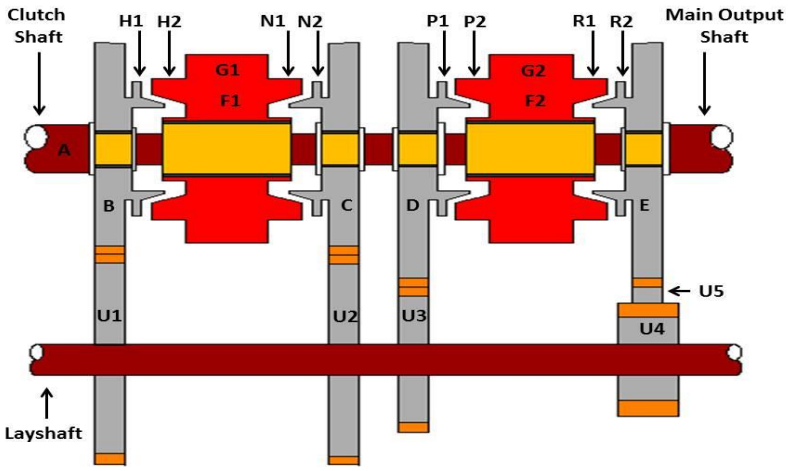
Tubed Tyre	**Tubeless Tyre**
1. Contains Tube Inside Tyre.	1. Does not contain Tube inside, tyre is directly mounted on rim.
2. Air retaining liner is not provided on tyre.	2. Air retaining liner is provided on tyre.
3. Non-return valve is provided in tube.	3. Non-return valve is provided on rim.
4. In case of puncture, tyre and tube needs to be removed	4. Tyre need not to be removed. Plug is inserted in place of puncture.
5. In case of puncture/burst tyre deflects suddenly which may lead to accidents.	5. Tyre deflects slowly and less chances of accidents.

6

One mark to each point

(6 points)

		6. Low air sealing quality.	6. better air sealing quality.
		7. Chances of valve removal from tube in case vehicle runs in punctured condition	7. No chances of valve removal.
		8. Suitable for spoked wheel rims.	8. Suitable for alloy cast rims.
6		**Attempt any TWO of the following: (2X6)**	**12**
	(a)	Explain the construction and working of synchromesh gear box.	**6**
	Ans.	:- (Diagram: -03 Marks Explanation: -03 Marks)	



Synchromesh Gearbox

Construction: - In construction it is similar to constant mesh gearbox. Here instead of dog clutch provision of synchromesh device is made to avoid necessity of double declutching. The parts which are to be engaged, are first brought into frictional contact which equalizes their speed, after which these may be engaged smoothly.

Working:

Neutral: In neutral clutch shaft gear rotates lay shaft, which in turn drives gears on main shaft which are free to rotate on main shaft. The synchronizer units are positioned in such a way that they do not contact the main shaft gears and therefore no drive can be transmitted to the main shaft.

First gear: For engagement of first gear, the synchronizer unit (1) is moved towards gear D. The friction facing M1 and M2 comes in contact and equalizes the speed of gear D and synchronizer. As soon speed equalizes, the sleeve G slides on clutch hub F by overriding the balls and get engaged with dog teeth k, this action locks the first gear wheel to the main shaft. The power flow is A-B-U1-U3-D-Synchronizer 1-main shaft.

Second gear: For engagement of second gear, the synchronizer unit (2) is moved towards gear C. The friction facing MI and M2 comes in contact and equalizes the speed of gear C and synchronizer. As soon speed equalizes, the sleeve G slides on clutch hub F by overriding the balls and get engaged with dog teeth k, this action locks the second gear wheel to the main shaft. The power flow is A-B-U1-U2-C-Synchronizer 2-main shaft.

Top gear: Top gear is a direct drive obtained by moving the synchronizer unit (2)

towards gear B. The friction facing contacts and equalizes the speed and then the sleeve is moved to engage with dog teeth K. This locks clutch shaft to main shaft. The drive is then transmitted directly from the clutch shaft to main shaft with no intermediate gear involved.

Reverse gear: To enable the vehicle to move backward a reverse idler gear (US) must be employed. Reverse gear is engaged by moving the synchronizer unit (1) towards gear E. The friction facing contacts and equalizes the speed and then the sleeve is moved to engage with dog teeth K. This locks the gear E and synchronizer I and power flows to the main shaft. The power flow is A-B-U1-U4-US-E-Synchronizer 1-main shaft.

(b) **Explain wire harness and describe colour coding used in automobile wiring Systems.** — **6**

Ans.

Wire harness

1. A cable harness, also known as a wire harness, wiring harness, cable assembly, wiring assembly or wiring loom, is an assembly of electrical cables or wires which transmit signals or electrical power.
2. The cables are bound together by a durable material such as rubber, vinyl, electrical tape, conduit, a weave of extruded string, or a combination.

02

3. Commonly used in automobiles, as well as construction machinery, cable harnesses provide several advantages over loose wires and cables. For example, many aircraft, automobiles and spacecraft contain many masses of wires which would stretch over several kilometers if fully extended. By binding the many wires and cables into a cable harness, the wires and cables can be better secured against the adverse effects of vibrations, abrasions, and moisture.

Colour coding

1. For quick identification, insulations of various wires in a circuit are assigned different
colors.
following seven color code system mentioned below, used in an automobile.

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Sr. No	Color	Circuit	Example with Tracer
1.	Brown	Battery and generator circuit	Starter switch to control box – brown with blue tracer.
2.	Yellow	Overdrive circuit	Overdrive switch or column to overdrive relay- yellow with green tracer.
3.	White	Ignition circuit and all other requirements when ignition circuit with red tracer. Is switched ON without fuse protection.	Starter switch to solenold switch-white with red tracer.

04

(1/2 each)

	4.	Green and light green	Auxiliary circuits fed through ignition switch as well as projected by ignition auxiliary fuse	Stop lamp switch to stop lamp - green with purple tracer.
	5.	Purple	Circuits protected by fuse and normally not controlled by the invention switch.	
	6.	Blue	Head lamp circuits.	Horn push to horn purple with black tracer.
	7.	Red	Side and tail lamp circuit including fog lamp, panel lights etc.	Lighting switch to head lamp - blue with white tracer.
	8.	Black	Earth (ground) circuits.	

(c) **Explain Passenger Comfort and safety.** **6**

Ans. **Ans: -**

A) **Comfort: -** Passenger comfort becomes an important concern nowadays. To provide better comfort to the passenger following parameters are requiring to be maintain.

1.Suspension: -It should support the vehicle & reduce the effect of shock forces.

2.Temperature: -Automatic Climate control should be enabled to maintain the best environment.

3.Seating arrangement: - Power seat is provided to maintain the suitable position to the driver. Seat lumber can be adjusted according to requirements. **02**

4.Navigation system: - it is satellite based system which helps to provide the direction of other location.

5.Fabrics used for Interior, seats, door handle etc. are design to be extremely durable & Stain resistant.

B)**Safety** of an automobile is very important parameter which can be ensured by two considerations:

1.Preventive design

2. passive safety feature

1.Preventive design: Preventive design is used to provide better comfort for driving and to provide safety design of various system of vehicle. When vehicle system helps to prevent crash by providing the driver with better ways of controlling the vehicle and avoiding hazards are called as "Active safety Features". **02**

1. There should be largest, possible glass area with minimum blind spot caused by body pillars. This will increase driver's efficiency during parking and when driving in heavy traffic. 2. Good mirror will enable the drivers to see potential hazards when reversing, parking or changing the lane on road.

3. Headlight must be of good design and have adequate intensity of light. They should give the driver a good view of the road ahead and roadside without distracting or

		blinding oncoming traffic. 4. The instrument panel should be adequate designed so that the driver should be able to read and see all meters and indicators without any distraction. Further all the necessary information should be provided on the dashboard panel in such a way that no special attention is needed on the part of the driver to grasp the significance of any information. 5. The control panel should be located near the driver seat so that he is fatigued minimum. 6. The driver's seat should be comfortable and adjustable according to the driver's requirements. Because it provides support for correct posture and prevents cramped up feeling on longer tours. 7. The vehicle noise should be minimum. The suspension for engine, gear box and front axle should be insulated against noise from engine. 8. Adjustable steering wheel which can be correctly positioned for better control and minimum fatigue. **2. Passive safety feature:** Passive safety features are the features which minimize or prevent the injury to the vehicle's occupants at the time of accident or in a crash condition. Passive safety feature helps to absorb the crash forces, some restrain occupant from colliding with the vehicle body. 1. In case of accident it is very important that, the door of vehicle stay properly closed until the car comes to rest because if the door opens the chances of the person thrown out and being killed are increased. Therefore the door should be fitted with suitable safety locks. 2. The interior of the cars should be suitably upholstered with adequate padding so that it Protects the passengers from the impact of injuries. 3. The steering column and wheel of the car should have adequate design so that in case of a collision they should give away and thus avoid causing injury to the driver. 4. Various switches and controls etc. should be so shaped that they are not protruding excessively so as to cause injury to the occupants at the front seat of the car. 5. The windscreen should be made up of laminated safety glass. 6. The front seat should be fixed to the floor so that they will not become loose even when subjected to very high forces.	**02**
		END	

SUMMER – 2022 EXAMINATION

Subject Name: **Model AnswerSubject Code:** XXXXX

Q. No.	Sub Q. N.	Answer	Marking Scheme
