Time: 3 Hours   **Marks: 80**

N.B.   **(1) All questions carry equal marks.**
         (2) Question No. 1 is Compulsory.
         (3) Attempt any three questions from remaining five questions.
         (4) Figures to the right indicate full marks.
         (5) Draw neat sketches wherever necessary

Q. 1.   Attempt any four out of six.   **20**

        a) Explain Aerodynamics for automotive application.

        b) Explain bluff body.

        c) Explain different types of drag?

        d) Classify of wind tunnels.

        e) Define stagnation point. Sketch the car with the location of stagnation point when air flow is taking place around the car.

        f) Explain effects of surface finish on aerodynamics of vehicle.

Q. 2.   A) Explain in brief the limitations of simulations of wind tunnel testing?   **10**

        B) Explain Open type wind tunnel with advantages and disadvantages.   **10**

Q. 3.   A) Explain how to measure the drag force and wind velocity in the wind tunnel?   **10**

        B) Explain the different resistances to the vehicle, when vehicle is in motion.   **10**

Q. 4.   A) Explain several forces and moments acting on the vehicle.   **10**

        B) Explain various modification of Truck and Bus for low drag.   **10**

Q. 5.   A) Draw & explain the concept of low drag profile.   **10**

        B) Explain aerodynamics considerations for High-performance vehicle.   **10**

Q. 6.   A) Explain the devices used for improving performance of car.   **10**

        B) Explain in brief Boundary layer separation.   **10**

_____

(Time: 3 Hours)   Total Marks: 80

N.B.: (1) Question no 1 is compulsory.
         (2) Attempt any three out of remaining five questions.
         (3) Figures to the right indicate full marks.
         (4) Illustrate your answers with sketches wherever necessary.

Q.1	**Attempt following:**	20
a	Explain Accidents, Causes & its analysis.	10
b.	Explain the importance of Traffic navigation and Global positioning system in traffic management.	10
Q.2	**Attempt following:**	20
a.	Write a short note on One time tax.	05
b.	Explain MACT (Motor Accident Claims Tribunal).	05
c.	Explain rules regarding Storage & transportation of petroleum products.	10
Q.3	**Attempt following:**	20
a.	Explain Scheduling of goods transport.	10
b.	Explain traffic Offences, penalties & procedures.	10
Q.4	**Attempt following:**	20
a.	Explain different types of Insurance & its significance.	10
b.	Explain in detail about Theory of fares-Basic principles of fare charging.	10
Q.5	**Solve any FOUR from following:**	20
a.	Explain the tax which is paid at Vehicle Registration Renewal.	05
b.	Explain the points mentioned in Surveyor's report.	05
c.	Explain Economics & records relating to passenger transport operation.	05
d.	Write a short note on Intelligent Transport System.	05
e.	Write a short note on Fitness of a Motor Vehicle.	05
Q.6	**Attempt following:**	20
a.	Explain Licensing of drivers & conductors.	10
b.	Explain the difference between Comprehensive plus zero depreciation And Third party insurance.	05
c.	Explain Bus Rapid Transport system.	05

****

Time: 3 Hours   **Total Marks: 80**

NB: -   1) Draw neat sketches wherever necessary.
        2) **Q. No. 1** is compulsory.
        3) Solve any **three** questions from the remaining five questions.
        4) Assume suitable data wherever necessary.

Q.1 Answer **any four** of the following: **20**
   a)   Write about various Sensors used for Automobile control
   b)   Write about "Conicity" and "Ply Steer"
   c)   Describe the sources responsible for vehicle vibration
   d)   Explain Four wheel steering
   e)   Sketch and explain "Variable rate leaf spring"

Q.2 a)   Sketch and Explain "SAE Tyre axis system" in detail.   **10**
   b)   Find the geometry that would be necessary to achieve 100% anti-squat in the rear suspension
        and the geometry to achieve full anti-pitch for the solid axle rear wheel drive vehicle described
        below:
        Designed weight of the vehicle=18046.43N; The front suspension (stiffness) rate= 21.7 KN/m.;
        The rear suspension (stiffness) rate= 25 KN/m.; The CG height = 0.508 m; Wheel base=2.744
        m; Also find the pitch rate, when the geometry is set for 100% anti-squat in the rear suspension.
                                                                                          10

Q.3 a)   What is "Roll center"? Sketch and Locate the Roll Centers for the followings: **10**
        i.   Four link type suspension
        ii. Mac-pherson strut suspension
        iii. Swing axle Type suspension
        iv. Hotchkiss suspension
   b)   Derive an equation to find out pair of double conjugate points with suitable sketch.   **10**

Q.4 a)   Describe any the followings with suitable diagram: **10**
        i)   Central Tyre Inflation System   ii)   Tyre Construction
   b)   Find the double/doubly conjugate points for a vehicle with following data: **10**
        Total mass=800Kg; Sprung mass=727 Kg; Wheel base=2.286m;
        Front/Rear weight distribution=63/37; Front suspension stiffness=21.7 KN/m;
        Rear suspension stiffness=25KN/m; Use $(K^2/L_1 L_2) =1$.

Q.5 a)   Prove that $C_{12} = C_{21}$ for Equalizing Suspension   **10**
   b)   Find the pitching & bouncing frequencies for a passenger car having the following data:
        Sprung mass =1450 Kg; Wheel base= 3.05 m; Position of CG from front axle=1.37 m;
        Front stiffness rate= 33KN/m;
        Rear stiffness rate=33.75KN/m; Use Radius of gyration: K =1.22 m.   **10**

Q.6 Write short note on **(Any Four)**   **20**
        a)   Magic tyre formula
        b)   Total Road load and Rolling resistance
        c)   Anti squat and Anti dive Suspension geometry
        d)   "Understeer" and "oversteer".
        e)   Properties of double conjugate points

_____

(3 Hours)   Total Marks: -80

N.B: (1) Question no 1 is compulsory.

       (2) Attempt **any three** out of remaining five questions.

Q.1   Answer any **four** out of six questions:

a   Compare lead acid battery with lithium ion battery.   05

b   Explain any two torque terms associated with starter motor.   05

c   Enlist the advantages of electronic ignition system.   05

d   Explain the role of relays in automobile.   05

e   Explain the different types of connectors used in automotive wiring.   05

f   Write a short note on OBD-II.   05

Q.2   a   Enlist various modern energy storage devices. Also explain any one of them in detail.   10

     b   Explain with a neat labelled diagram the construction and working mechanism of integrated starter generator.   10

Q.3   a   Enlist various types of automotive protocols. Also explain the most widely used automotive protocol in passenger vehicles.   10

     b   Explain the working principle of stepper motor. Also explain its application in automobiles.   10

Q.4   a   Explain the need for color coding for automotive wiring. Also explain automotive wiring color codes in detail.   10

     b   Explain in detail any one intelligent vehicle system.   10

Q.5   a   Explain the working mechanism of solenoid with a neat labelled diagram.   10

     b   Enlist different categories of EVs. Also explain the role of 48 Volt technology in electric vehicles.   10

Q.6   a   Enlist the requirements for starting system in automobiles. Also explain the working mechanism of alternator.   10

     b   Explain the need for reflectors in automobiles. Also explain the constructional features of any three reflectors.   10

_____

Duration: 3 Hours   **Maximum Marks: 80**

N.B.: -

1. Question No 1 is Compulsory
2. Solve any three questions from remaining questions
3. Assume suitable data if required and mention it clearly
4. Figures to right indicate full marks

Q1		Solve any four of following	
	[A]	Explain change management for PLM.	5
	[B]	Explain concept of reference model	5
	[C]	Explain reasons for implementing a PDM	5
	[D]	Explain need for Life Cycle Environmental Strategies.	5
	[E]	Explain limitations of Life Cycle Assessment	5
Q2	[A]	Explain various End-of-Life Strategies with suitable examples	10
	[B]	Explain various barriers to PDM implementation	10
Q3	[A]	Explain various phases of LCA in ISO Standards	10
	[B]	Explain role of Modelling and simulations in Product Design with suitable example.	10

Q4 [A] Explain what do you mean by New Product Development (NPD) and explain following concepts: -
      i.   Product Configuration
      ii. Variant Management   **10**

    [B] With suitable example explain how will you develop PLM Vision and PLM Strategy.   **10**

Q5 [A] With suitable example explain relationship of Concurrent Engineering and Life Cycle Approach   **10**

    [B] Explain the concept of Design for Environment with suitable example.   **10**

Q6   Write Short notes on:-

    [A] General Framework for LCCA   **10**

    [B] 3D CAD systems and realistic rendering techniques   **10**

****

64942