

(3 hours)

Total Marks: 80

1. Question No. 1 is compulsory.
2. Attempt any 3 questions out of 5 questions.
3. Figures to the right indicate full marks.
4. Illustrate your answers with sketches wherever necessary

Q1 Attempt any four from following six questions

- | | | |
|----------|---|----------|
| a | What are the various sources of wind noise in an automobile? | 5 |
| b | What is shape optimization? | 5 |
| c | Explain how fuel consumption of vehicle is affected by aerodynamic of car | 5 |
| d | What are spoilers & air dams? | 5 |
| e | What are the external device to reduce drags of Bus ? | 5 |
| f | Write short note on Ahmed Body | 5 |

Q2

- | | | |
|----------|--|-----------|
| a | Explain the process of formation and separation of a boundary layer and separation bubble on a car | 10 |
| b | Explain the formation of wake region on different car body styles (hatchback, fastback and notchback). | 10 |

Q3

- | | | |
|----------|---|-----------|
| a | What is Various modification of the cabin and trailer to reduce drag. body. | 10 |
| b | Explain Aerodynamics of a race car | 10 |

Q4

- | | | |
|----------|--|-----------|
| a | What are various types of drag acting on a vehicle, explain in details? | 10 |
| b | Explain different features that can be incorporated in a vehicle to reduce aerodynamic drag. | 10 |

Q5

- | | | |
|----------|--|-----------|
| a | Explain aesthetic aspect in automobiles | 10 |
| b | Explain different types of Wind tunnel and its working and construction. | 10 |

Q6

- | | | |
|----------|---|----------|
| a | Discuss ride versus handling issues | 5 |
| b | What is the effect of surface finish on aerodynamics of the car? | 5 |
| c | Enlist parameters on which drag on a car depends | 5 |
| d | Discuss the effect of dirt accumulation on the performance of vehicle | 5 |

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 Licensing of drivers & conductors.	10
	b. Explain Different types of Tax at Vehicle Registration Renewal.	10
Q.2	Attempt following.	20
	a. Explain in detail Procedure of Investigation & Settlement of Insurance.	10
	b. Explain Scheduling operation & control of passenger transport operation.	10
Q.3	Attempt following.	20
	a. Explain Scheduling of goods transport.	10
	b. Explain the importance of Traffic navigation and Global positioning system in traffic management.	10
Q.4	Attempt following.	20
	a. Explain various permit in detail.	10
	b. Explain various types of insurance in detail.	10
Q.5	Attempt following.	20
	a. Explain depot layout with neat sketch.	10
	b. Explain Traffic rules, Signals & controls.	10
Q.6	Attempt following.	20
	a. Explain the duty of Surveyor & Loss Assessor also mention what kind of information is mentioned in Surveyor's report?	10
	b. What are requirements and Problems on fleet management?	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] With respect to Product Life Cycle Management explain opportunities to Globalization. **5**
 - [B] Explain concept of organization and decomposition in Product design **5**
 - [C] Explain importance of Product Data Management System **5**
 - [D] Explain need for life cycle environmental strategies. **5**
 - [E] How will you develop PLM vision and PLM Strategy **5**
- Q2 [A] Explain useful life extension strategies with suitable example **10**
[B] Explain general framework for LCCA **10**
- Q3 [A] Explain various barriers to PDM implementation **10**
[B] Explain concept of digital mock-up in detail **10**
- Q4 [A] Provide financial justification for PDM implementation **10**
[B] Explain phases of LCA in ISO standards **10**
- Q5 [A] What do you mean by design for X? Explain choice of Design for X tools and their use in design process **10**
[B] Explain various Product Life Cycle phases with suitable example **10**
- Q6 Write short notes on:-
- [A] Concurrent Engineering **10**
 - [B] Modelling and Simulation in Product Design **10**

Time: 3 Hours

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 followings:

20

- a) Write about various Aerodynamic aids used to reduce profile drag
- b) Describe “Central Tyre Inflation System”
- c) Explain how self aligning torque is developed?
- d) Enlist various sensors used for Automobile control. Sketch and explain any one of them.
- e) Define and explain understeer and oversteer.

Q.2 a) Describe interconnected suspension system with suitable diagram and write about its importance

10

b) Find the position of double conjugate points for a vehicle with the following data: **10**

- Total mass = 1040 kg
- Sprung mass = 945 kg
- Wheel base = 2.268m
- Front/Rear weight distribution = 60/40
- Front suspension rate = 21.7 KN/m
- Rear suspension rate = 25.0 KN/m
- Take: $(K^2/L_1L_2) = 1$

Q.3 a) Derive an equation to find out pair of double conjugate points with proper sketch. **10**

b) Explain various sources of vehicle vibration and also explain vibration isolation. **10**

Q.4 a) Describe any two of the followings: **10**

- i) Active Suspensions
- ii) Four wheel steering
- iii) Conicity and ply-steer

b) Derive the equations for pitch and bounce motion frequencies of a vehicle. **10**

Q.5 a) What is “roll center” and “roll axis”? Draw and locate the roll centers for any three types of suspensions **10**

- b) Find the geometry that would be necessary to achieve 100% anti-squat in the rear suspension and also find the geometry to achieve full anti-pitch for the solid axle rear wheel drive vehicle as described below:

The designed weight of the vehicle=18046.43N; The front and rear suspension rates are 21.7kN/m and 25kN/m respectively; The CG height=0.508m; Wheel base=2.75m.

Also find the pitch rate, when the geometry is set for 100% anti-squat in the rear suspension

10

Q.6 Write short note on (Any Four)

20

- a) "Mourice-Olley's criteria"
 - b) Aerodynamic forces and moments acting on a car.
 - c) "SAE Tyre axis system"
 - d) Variable rate leaf spring
 - e) Magic tyre formula
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3 Hours

(80 Marks)

- 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 questions

- A) Explain Global Positioning system (GPS) in detail. (5)
B) Explain trafficator and its working. (5)
C) Explain stepper motor with neat sketch. (5)
D) Explain the use of CAN protocol in automobiles. (5)
E) Explain the need for integrated starter motor and alternator. (5)
F) Explain in brief, modern energy storage devices. (5)

- Q.2)** A) Describe capacitor discharge and distributor less ignition system. (10)
B) Explain in detail three types of battery ratings. (10)

- Q.3)** A) Describe the construction of sealed beam headlamp. Also explain headlight beam setting and adjustment. (10)
B) Write in detail construction and working of alternator. (10)

- Q.4)** A) Explain working of alkaline and zebra batteries. (10)
B) Write note on: (i) Automotive embedded system (5)
(ii) Telematics and its applications (5)

- Q.5)** A) Explain folo thorough barrel and rubber compression starter motor drive. (10)
B) Discuss in brief the different layouts in 48-volt technology. (10)

- Q.6)** A) Write in detail construction and working of solenoid and thermal actuators. (10)
B) Explain various cables, their sizes, color codes and wiring harness systems used in Automotive vehicles. (10)