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Enrollment No.....



Faculty of Engineering
End Sem Examination May-2024
AU3EL02 Automotive Safety Systems

Programme: B.Tech.

Branch/Specialisation: AU

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. The following design techniques/strategies are to be followed while designing a car body: **1**
(a) Desired dummy performance
(b) Stiff cage structural concept
(c) Controlled progressive crush and deformation with limited intrusion
(d) All of these
- ii.consists of the main energy absorbing structure before the power train: **1**
(a) Primary crush zone
(b) Soft front zone
(c) Secondary crush zone
(d) Weight efficient energy absorbing structures
- iii. Air bags, crumple zones and side impact protection system is: **1**
(a) Active system (b) Passive system
(c) Reactive system (d) Responsive system
- iv. Which of the following is not an active safety system? **1**
(a) Parking sensors (b) ABS system
(c) Air bags (d) Stability control
- v. Adjustable strap that goes over the waist is: **1**
(a) Two point seat belt (b) Three point seat belt
(c) Four point seat belt (d) Lap seat belt
- vi. is a device that greatly increases driver survivability in the event of a head on collision: **1**
(a) Seat belt (b) Collapsible steering column
(c) Crumple zone (d) Air bags
- vii. The minimum range of detection by a pulse radar depends on: **1**
(a) Average transmitter power (b) Beam width of antenna
(c) Pulse width (d) All of these

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- viii. Radar transmits pulsed electromagnetic energy because: **1**
(a) It is easy to measure the direction of target
(b) It provides very ready measurement of range
(c) It is very easy to identify the targets
(d) None of the above
- ix. Garage door opener is a: **1**
(a) Transceiver (b) Receiver (c) Transmitter (d) None of these
- x. The central locking system can be switched on and off by: **1**
(a) Central position switch inside vehicle
(b) Ignition switch
(c) Both (a) and (b)
(d) None of these
- Q.2 i. What do you mean by design of body for safety? **2**
ii. What is meant by crumple zone? Why it is important? **3**
iii. Explain various engine locations and its impact on safety. **5**
OR iv. Explain safety sandwich construction in detail with sketch. **5**
- Q.3 i. What is meant by perceptibility safety? **2**
ii. Explain deformation behaviour of vehicle body with sketch. **8**
OR iii. Explain speed and acceleration characteristics of passenger compartment on impact in detail with sketch. **8**
- Q.4 i. What is meant by seat belts? Write different types of seat belt. **3**
ii. Explain construction of collapsible steering column with sketch. **7**
OR iii. Explain electronic system for activating air bags in detail with sketch. **7**
- Q.5 i. Write the causes of rear end collision **4**
ii. Explain rear vehicle object detection system with sketch. **6**
OR iii. Explain object detection system with braking system interactions. **6**
- Q.6 Attempt any two: **5**
i. Explain the working of central locking system with sketch. **5**
ii. Explain tyre pressure control system with sketch. **5**
iii. Explain the working of environment information system. **5**

P.T.O.

Marking Scheme

Automotive Safety System (T) - AU3EL02 (T)

Q.1	i)	The following design techniques/strategies are to be followed while designing a car body:	1
	d)	All of the above	
	ii)consists of the main energy absorbing structure before the power train:	1
	a)	Primary crush zone	
	iii)	Air bags, crumple zones and side impact protection system is:	1
	b)	Passive System	
	iv)	Which of the following is not an active safety system?	1
	c)	Air bags	
	v)	Adjustable strap that goes over the waist is:	1
	d)	Lap seat belt	
	vi)is a device that greatly increases driver survivability in the event of a head on collision:	1
	a)	Seat belt	
	vii)	The minimum range of detection by a pulse radar depends on:	1
	d)	All of these	
	viii)	Radar transmits pulsed electromagnetic energy because:	1
	b)	It provides very ready measurement of range	
	ix)	Garage door opener is a:	1
	c)	Transmitter	
	x)	The central locking system can be switched on and off by:	1
	c)	Both a and b	
Q.2	i.	What do you mean by design of body for safety?	2
		Design of body for safety - 2 Marks	
	ii.	What is meant by crumple zone? Why it is important?	3
		Crumple zone 2 Marks	
		Importance of crumple zone 3 Marks	
	iii.	Explain various engine locations and its impact on safety.	5
		Various engine locations 3 Marks	
		Impact on safety 2 Marks	
OR	iv.	Explain safety sandwich construction in detail with sketch.	5
		Explanation -3 Marks	
		Sketch -2 Marks	
Q.3	i.	What is meant by perceptibility safety?	2
		Perceptibility safety -2 Marks	
	ii.	Explain deformation behaviour of vehicle body with sketch.	8
		Explanation -5 Marks	

OR	iii.	Sketch	-3 Marks	8
		Explain speed and acceleration characteristics of passenger compartment on impact in detail with sketch.		
		Speed characteristics	-3 Marks	
		Acceleration characteristics	-3 Marks	
Q.4	i.	Sketch	-2 Marks	3
		What is meant by seat belts? Write different types of seat belt.		
		Seat belts	-1 Mark	
		Types of seat belts	-2 Mark	
	ii.	Explain construction collapsible steering column with sketch.		7
		Explanation	-4 Marks	
		Sketch	-3 Marks	
		Explain electronic system for activating air bags in detail with sketch.		
OR	iii.	Explanation	-4 Marks	7
		Sketch	-3 Marks	
		Explain electronic system for activating air bags in detail with sketch.		
		Explanation	-4 Marks	
Q.5	i.	Write the causes of rear end collision?		4
		Any 4 causes	-4*1=4 Marks	
		Explain rear vehicle object detection system with sketch.		
		Explanation	-4 Marks	
	ii.	Sketch	-2 Marks	6
		Explain object detection system with braking system interactions.		
		Explanation	-4 Marks	
		Sketch	-2 Marks	
OR	iii.	Explain object detection system with braking system interactions.		6
		Explanation	-4 Marks	
		Sketch	-2 Marks	
		Explain the working of central locking system with sketch.		
Q.6	i.	Explanation	-3 Marks	5
		Sketch	-2 Marks	
		Explain tyre pressure control system with sketch.		
		Explanation	-3 Marks	
	ii.	Sketch	-2 Marks	5
		Explain the working of environment information system.		
		Explanation	-5 Marks	
