Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

AU3EL02 Automotive Safety System

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.

Q.1 i. Head restraints are an **1**

(a) Automotive style feature
(b) Automotive safety feature
(c) Automotive performance feature
(d) None of these

ii. A 'bucket seat' can accommodate how many persons **1**

(a) One (b) Two (c) Four (d) None of these

iii. The loads supported by an automobile frame are **1**

(a) Weight of the body, passengers and cargo loads
(b) Torque from engine and transmission
(c) Sudden impacts from collisions
(d) All of these

iv. The reflector used in automobile head lamp is off **1**

(a) Spherical shape (b) Hemispherical shape
(c) Hyperbolic shape (d) Parabolic shape

v. Break away capsule is a safety drive associated with **1**

(a) Brake (b) Airbag (c) Engine (d) Steering column

vi. The seat belt tensioners are built in the **1**

(a) Front seat (b) Seat belt retractors
(c) Shoulder anchors (d) Seat belt buckles

vii. What kind of gas inflates an airbag? **1**

(a) Hydrogen (b) Oxygen (c) Helium (d) Nitrogen

viii. What area of a car is designed to deform in a collision? **1**

(a) The door (b) The interior
(c) The crumple zone (d) None of these

P.T.O.

ix. ESP keeps your car safely on track. ESP stands for? **1**
(a) Electronic Stability Program
(b) Electronic Stabilizing Pulse
(c) Extra Safety Program
(d) Electric Stability Program

x. In the air brake system, the valve which regulates the line air pressure is **1**
(a) Brake valve (b) Delivery valve
(c) Unloader valve (d) Thermostat valve

Q.2 i. What is meant by crumble zone? **2**

ii. Deceleration on impact with movable vehicle is less danger than the stationary object. Explain. **3**

iii. Discuss the energy equation for automotive vehicle safety system. **5**

OR iv. Discuss the design of vehicle body with respect to safety system? **5**

Q.3 i. Define active and passive safety system. **2**

ii. What do you mean by external safety system? **3**

iii. Explain the acceleration characteristics of passenger compartment in frontal impact with neat sketch. **5**

OR iv. With a neat sketch explain the deformation behaviour of vehicle body. **5**

Q.4 i. What is the function of acceleration sensor in air bag? **2**

ii. What are the safety aspects of bumper design? **3**

iii. Explain the construction and working principles of collapsible steering **5**

OR iv. Explain the construction and working of automatic seat belt tightener system with neat sketch. **5**

Q.5 i. What are the causes of rear end collisions? **4**

ii. What is meant by adaptive cruise control? Explain the working of a typical adaptive cruise control system used in a modern car. **6**

OR iii. Briefly explain the construction and working principles of ABS system. **6**

Q.6 Attempt any two:

i. List out and explain the systems that are purely enhancing the comfort and convenience of the passengers in a vehicle. **5**

ii. Give the construction and working principles of control locking system. **5**

iii. Explain in detail the construction and working of environment information system. **5**

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Marking Scheme
AU3EL02 Automotive Safety System

Q.1	i.	Head restraints are an (b) Automotive safety feature		**1**
	ii.	A 'bucket seat' can accommodate how many persons (a) One		**1**
	iii.	The loads supported by an automobile frame are (d) All of these		**1**
	iv.	The reflector used in automobile head lamp is off (d) Parabolic shape		**1**
	v.	Break away capsule is a safety drive associated with (d) Steering column		**1**
	vi.	The seat belt tensioners are built in the (b) Seat belt retractors		**1**
	vii.	What kind of gas inflates an airbag? (d) Nitrogen		**1**
	viii.	What area of a car is designed to deform in a collision? (c) The crumple zone		**1**
	ix.	ESP keeps your car safely on track. ESP stands for? (a) Electronic Stability Program		**1**
	x.	In the air brake system, the valve which regulates the line air pressure is (c) Unloader valve		**1**
Q.2	i.	Crumble zone		**2**
	ii.	Deceleration on impact with movable vehicle is less danger than the stationary object.		**3**
	iii.	Energy equation for automotive vehicle safety system Stepwise marking		**5**
OR	iv.	Design of vehicle body with respect to safety system Stepwise marking		**5**
Q.3	i.	Definition of active safety system	1 mark	**2**
		Passive safety system	1 mark	
	ii.	External safety system		**3**
	iii.	Characteristics of passenger compartment	3 marks	**5**
		Diagram	2 marks	
OR	iv.	Deformation behaviour of vehicle body		**5**
		Diagram	2 marks	
		Explanation	3 marks	
Q.4	i.	Function of acceleration sensor in air bag		**2**
		1 mark for each function	(1 mark * 2)	
	ii.	Safety aspects of bumper design		**3**
		1 mark for each aspect	(1 mark *3)	
	iii.	Construction of collapsible steering	3 marks	**5**
		Working principles of collapsible steering	2 marks	
OR	iv.	Automatic seat belt tightener system		**5**
		Construction	1 mark	
		Working	2 marks	
		Diagram	2 marks	
Q.5	i.	Causes of rear end collisions		**4**
		1 mark for each cause	(1 mark * 4)	
	ii.	Adaptive cruise control	2 marks	**6**
		Working of a typical adaptive cruise control system	4 marks	
OR	iii.	Construction of ABS system	3 marks	**6**
		Working principles of ABS system	3 marks	
Q.6		Attempt any two:		
	i.	Systems that are purely enhancing the comfort and convenience of the passengers in a vehicle		**5**
		Any two 2.5 marks for each	(2.5 marks * 2)	
	ii.	Construction of control locking system	3 marks	**5**
		Working principles of control locking system	2 marks	
	iii.	Construction of environment information system	2 marks	**5**
		Working of environment information system	3 marks	

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