

Term End Examination, Nov - 2013

S.Y. M. Tech Auto. Tech. CoEP (Sem III)

Sub: Automotive Safety & Lighting

Date: 18.11.2013

Time: 2.00 to 5.00 pm.

Max. Marks: 100

Instructions:

1. Figures to right indicate full marks.
2. Draw neat figures wherever required.
3. Use of non- programmable calculator is allowed
4. Answers to both the sections should be written in same Answer sheet with a gap of one page.

SECTION I

Q.1 Choose the correct answer (1 mark each)

(05)

- A. Body dimension data distribution is usually represented by
- a. Normal distribution
 - b. Persian distribution
 - c. Random distribution
 - d. Parabolic distribution
- B. Primary restraint system is:
- a. Airbag
 - b. Seat Belt
 - c. Steering column
 - d. Pre-tensioner
- C. ECE R 95 crash test is conducted at _____ km/h
- a. 56 km/h
 - b. 60 km/h
 - c. 64 km/h
 - d. 50 km/h
- D. For Head Restraint adjustable for height, the height shall be not less than _____ mm in case of front seats.
- a. 700 mm
 - b. 750 mm
 - c. 800 mm
 - d. 650 mm
- E. Which of the following is not a restraint system:
- a. Dashboard
 - b. Seat
 - c. Steering wheel
 - d. Crumple zone

Q.2 Answer any four following (5 marks each)

(20)

- A. A 1000 kg passenger car travelling at speed V impacts head-on a 6000 kg goods truck also travelling at speed V . Explain which will experience the greater
1. Force
 2. Impulse
 3. Change in momentum
 4. Change in velocity
 5. Change in acceleration
- B. A 1010 kg car crashes into a concrete barrier at 56 kmph. Solve the following:
1. The front end of the car crumples by 22 cm. What is the deceleration of the car and force experienced by the car? Assume constant deceleration.
 2. The driver in the car was belted and the belt brings the driver to a stop in 20 cm. Weight of the driver is 76 kg. Assuming constant deceleration, what is the deceleration and force on the driver?
 3. The passenger in the car was un-belted and hits the dashboard on impact. The dashboard brings the passenger to stop in 4 cm. Weight of the passenger is 76 kg. Assuming constant deceleration, what is the deceleration and force on the passenger?
 4. What is the percentage increase in force experienced by passenger when compared to driver?
- C. Explain the working of any 2 technologies of a 3 point seat belt
- D. Explain at least three maxims for good restraint system along with example. List requirements of Instrument Panel / Dashboard.
- E. List down atleast 04 body dimensions which are necessary input for an automotive driver's seat with justification

Q.3 Answer any five (5 marks each)

(25)

- A. Explain the importance of the following in Crash Testing:
- a. DAQ
 - b. Motion Analysis
 - c. High Speed Photography
 - d. Dummies
 - e. Sensors
- B. Explain adjustment systems, locking systems and displacement systems of seat in brief. List down design objectives of seat.
- C. Explain the Typical loading pattern on Seat Structure during:
- a. Side Impact
 - b. Frontal Crash
 - c. Rear Impact
- D. Draw the velocity vs displacement plot for the following involved in a frontal collision
1. Vehicle
 2. Unrestrained occupant
 3. Restrained occupant
- E. List the tests conducted under US NCAP ratings along with weightage attached to each test while calculating Vehicle Safety Score (VSS).
- F. List down objectives of Crash Testing. Mention atleast 6 types of Full Vehicle Crash Tests.
- G. What is meant by 'Anthropometry'? What are the tools used for collection of anthropometric data?

P.T.O.

SECTION II

Q.5. Choose a correct option and answer the following questions.

(10)

- A. Range of IR spectrum starts with
a. after 800 nm b. after 3000nm c. 380 nm d. None
- B. N2 Category of vehicles means _____
a. 5 tons < Maximum mass =< 12 tons b. 3.5 tons < Maximum mass =< 12 tons
c. Maximum mass > 12 tons d. none
- C. Fitment of gas discharge lamps in-conjunction with the _____ and _____ :
a. Head lamp cleaner & automatic leveling device b. Only Head lamp cleaner
c. Head lamp cleaner & manual leveling d. Only Automatic leveling
- D. Active lightings are:
a. Lighting devices b. Signaling devices c. Lighting and signaling devices d. None
- E. Telltale colour of direction Indicator is
a. Amber b. Green c. Blue d. Red
- F. The standard referred for two wheeled lighting installation is
a. AIS: 008 b. AIS:009 c. AIS:012 d. AIS:010
- G. The flashing rate of direction indicator is
a) 60 +/- 30 times per minute b) 90 +/- 30 times per minute
c) 150 +/- 30 times per minute d) None of the above
- H. Radiometry is a study of
a) Human visual response b) Optical radiation
c) Combination of both d) None of the above
- I. What is the device used for measuring the light distribution of automobile lamps?
a) Lux meter b) Integrating sphere c) Gonio-photometer d) None of the above
- J. What is cut-off luminous flux for the using the headlamp cleaning devices in head lamps?
a) 1650lumen b) 2000lumen c) 3500lumen d) None of the above

Q.6 Answer the following.

(10x2=20)

- What is light and explain the electromagnetic spectrum of the light?
- What is Luminance ? Where this unit is used in automobile application for the measurement?
- Define colour temperature? And what is the incandescent light colour temperature?
- What is luminous flux? And what are different types of flux measurement?
- Why lighting standards are required in automotive applications?
- Explain the technology progress of automotive lighting?
- What is horn? Explain construction and working principle of horn?
- What are head lamp cleaning devices and what is the necessity in automobile?
- What is solid angle and explain how this will used for measurement purpose.
- Why cosine correction of a detector is necessary and why a diffuser is put over the photodiode

P.T.O.

Q.7 Solve the following ~~two examples~~ (any four)

(5X4=20)

- a. What in Lamberts Law and Inverse square law for illumination?
- b. What is glare and explain the type of glare? How it will interact with night driving?
- c. What is Photometry of human eye? Define three types of human eye which are active at different level of brightness?
- d. What are the different types of headlamps available in automotive applications and what are advantage and disadvantage ? Explain the different steps followed for the testing of headlamps?
- a. Explain the different steps followed for the testing of headlamps?

***** All The Best *****