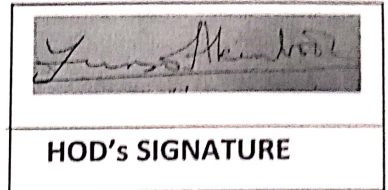




ELIZADE UNIVERSITY, ILARA-MOKIN
ONDO STATE, NIGERIA
DEPARTMENT OF AUTOMOTIVE ENGINEERING

SECOND SEMESTER EXAMINATIONS
2017/2018 ACADEMIC SESSION



COURSE: ATE 502 – Automotive Materials & Structures (3 Units)

CLASS: 500 Level Automotive Engineering

TIME ALLOWED: 2 Hours: 30 Min.

INSTRUCTIONS: Answer any 4 questions

Date: July/August, 2018

Question 1

- (a) Outline with detail explanation some of the likely deformation characteristics that an automobile can exhibit in operation.
- (b) As a freshly employed Engineer in an automobile industry, your employer confronted you with the complaints from consumers on the above noticeable faults enumerated in (a) above and asked for your advice. What selection strategies will you recommend to address these problems in the next production output?

Question 2

- (a) Define the following terms as encountered in your note concerning stress-strain relationship:
- (i) Elastic Deformation
 - (ii) Hook's Law
 - (iii) Poisson's Ratio
 - (iv) Modulus of Elasticity
 - (v) Bulk Modulus
- (b) With the aid of appropriate illustrative diagram derive an expression for Bulk Modulus, K , in terms of Modulus of elasticity, E and Poisson's Ratio, ν

Question 3

- (a) Outline the basic procedure for the construction of Mohr's Circle
- (b) For the stress state given below, sketch Mohr's Circle, compute the principal stress and its direction.

$$\sigma_x = 84 \text{ Mpa}, \sigma_y = -42 \text{ Mpa}, \tau_{xy} = 96 \text{ Mpa cw}$$

Question 4

- (a) Give a brief account of composite materials highlighting their potentials and applications in automotive industry.
- (b) Give brief explanation with relevant sketches some heat treatments commonly used for steels.

Question 5

- (a) Define what is meant by corrosion.
- (b) Apart from corrosion resisting qualities of coatings, outline all usefulness and their applications as applied to automotive industry.
- (c) Explain the significance and effects of ten of most important types of corrosion.