

- Q3a). Differentiate between modeling and simulation. 3Marks
- b). With the aid of a diagram explain the basic structure of a mechatronics system. 5Marks
- c). With the aid of a circuit diagram explain how a DC motor can be actuated. 7Marks
- Q4a). Explain briefly the terms in the mathematical models for electromechanical analogies for both translational and torsional dynamics respectively. 8 Marks.
- b). Draw and label a simplified diagram of an automobile's shock absorber subsystem. 3 Marks.
- c). Draw life curves for comparison purpose for a graduate engineer working in Nigeria and a counterpart working in Singapore. 4 Marks.
- Q5. In a single translational mass-spring-dash pot system, these values were used in an experiment; $k = 15 \text{ N/m}$, $m = 10 \text{ Kg}$, $F = 60 \text{ N}$, and $B = 30 \text{ N.s/m}$
- (i) Draw the forces equilibrium diagram 3 Marks.
- (ii) Determine the displacement of the 10 Kg mass along a horizontal surface or axis. 8Marks.
- (iii) What do you understand reliability, and unreliability to mean? How are both related? 4Marks