TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2306: INTRODUCTION TO ENGINEERING DESIGN

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

Instructions to Candidates
You should have the following for this examination
  -Answer Booklet, examination pass and student ID
This paper consists of **FIVE** questions. Answer any **THREE** questions. All questions carry equal marks.
Do not write on the question paper.

Question ONE

Discuss in detail the main stages involved in the design of a product until it is ready for manufacturing.

(20marks)

Question TWO

a) Explain your understanding of ergonomics and anthropometrics as used in engineering design.

(5 marks)

b) Describe four typical human behaviors to consider during design phase of a product.   **(5 marks)**

c) Discuss system reliability and its application in design of electronic and mechanical products.

(10 marks)

Question THREE

Discuss the main factors to include in the design of a product for manufacture.   **(20 marks)**

Question FOUR

The data given below gives activity duration and precedence relationships for a project.

Activity	Predecessor	Duration (weeks)
A	None	3
B	None	1
C	None	5
D	A	1
E	C	6
F	E	1
G	B, D,F	2
H	G	8

a)   .

    i.   Draw   CPM diagram.   **(4marks)**

    ii.   Calculate earliest event time and latest event for each event and indicate their values on the CPM diagram. **(4 marks)**

    iii.   Determine critical activities and show the critical activities on the CPM diagram.   **(2 marks)**

b)

    i.   Draw Gantt chart for an early start schedule.   **(5 marks)**

    ii.   Draw Gantt Chart for a late start Schedule**.**   **(5 marks)**

Question FIVE

a) Define the following terms with reference to limits and fits:

    i.   Tolerance

    ii.   Allowance

    iii.   Fundamental Deviation

                                                                        (3 marks)

b) Illustrate the following types of fit

    i.   Clearance fit

    ii.   Interference fit

    iii.   Transition fit   **(6 marks)**

c)

    i.   Given a hole of $30^{+0.25}_{-0.00}$ mm diameter and a shaft of $30^{+0.18}_{+0.02}$ mm in diameter determine :

- Tolerance on hole
- Tolerance on shaft
- Allowance
- Maximum Interference
- Maximum clearance
- Type of fit

    ii.   A hole is specified as 35 ± 0.016mm diameter. Determine the gauge limits for GO and NOT GO plug gauge to check this dimension. Take gauge Maker's tolerance as 10% of the work tolerance.

                                                                        (11 marks)