



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

**UNIVERSITY SPECIAL/SUPPLEMENTARY EXAMINATION FOR:**

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2306 : INTRODUCTION TO ENGINEERING DESIGN

END OF SEMESTER EXAMINATION

**SERIES:** APRIL 2016

**TIME:** 2 HOURS

**DATE:** Pick Date May 2016

## Instructions to Candidates

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

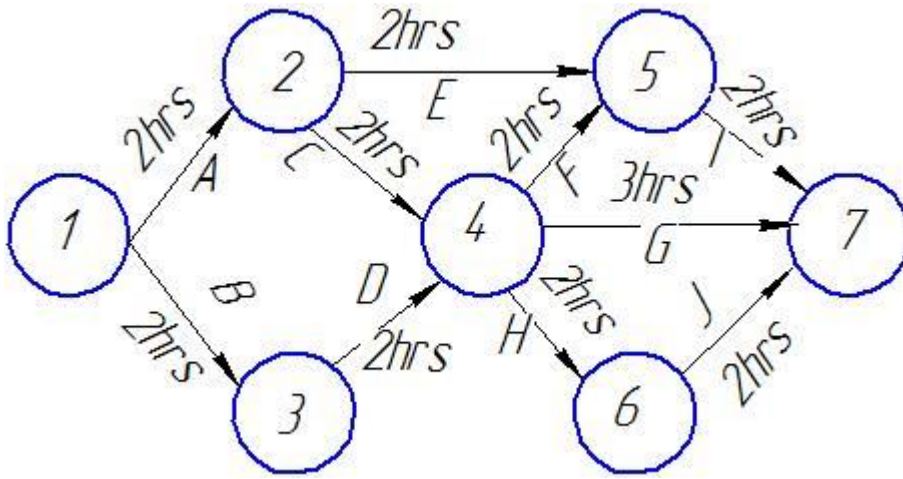
This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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## Question ONE

- a) Explain Analysis and Synthesis in Engineering design. **(4 marks)**
- b) Discuss the three categories of design standards **(6 marks)**
- c) List and explain in brief systematic methods of designing. **(5 marks)**
- c) The CPM network below is a representation of a maintenance schedule program for a machine complex. The Chief Engineer has a team of 7 personnel to execute the work. The time is shown for each activity is indicated that is in reference to one personnel. Distribute the workforce on the CPM network such that there are minimal delays between activities and most effective use of man power with shortest critical path time used. Tabulate the **Earliest Start time** and **Latest Start Time** between activities and the delay between activities for the CPM network developed. Also show the most effective distribution of the workforce on the CPM network. **(15 marks)**



**Question TWO**

- a) Explain the term Ergonomics as used in engineering. **(2 marks)**
- b) Discuss 10 factors that contribute to a user friendly design. **(5 marks)**
- c) Explain the 4 major decisions made over a lifecycle of a project in project planning in design. **(4 marks)**
- d) Explain the Pugh selection as a method for determining the best concept of design. **(9 marks)**

**Question THREE**

- a) Illustrate with the help of diagrams and calculation fit and tolerance stack up **(8 marks).**
- b) Explain methods used in developing cost estimates in engineering design. **(8 marks)**
- c) Discuss four creative thinking methods **(4 marks)**

**Question FOUR**

- a) Discuss the specific design rules for design for manufacture. **(8 Marks)**
- b) Discuss the planning phase on Asimow’s proposal for the design process **(10 marks)**
- c) Explain the **four** challenges that describe the design environment **(2 marks)**

**Question FIVE**

- a) Explain the terms reliability and safety in engineering design **(4 marks)**
- b) Explain the importance of simulation in the engineering design process. **(5 marks)**
- c) Explain the use of the safety factor in designed products. **(4 marks)**
- d) Discuss and illustrate by use of diagrams **Weibull Frequency Distribution** as used in reliability theory with an example of its area of application. **(7marks)**