



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

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.

Question ONE

a) Discuss the various types of design undertaken.

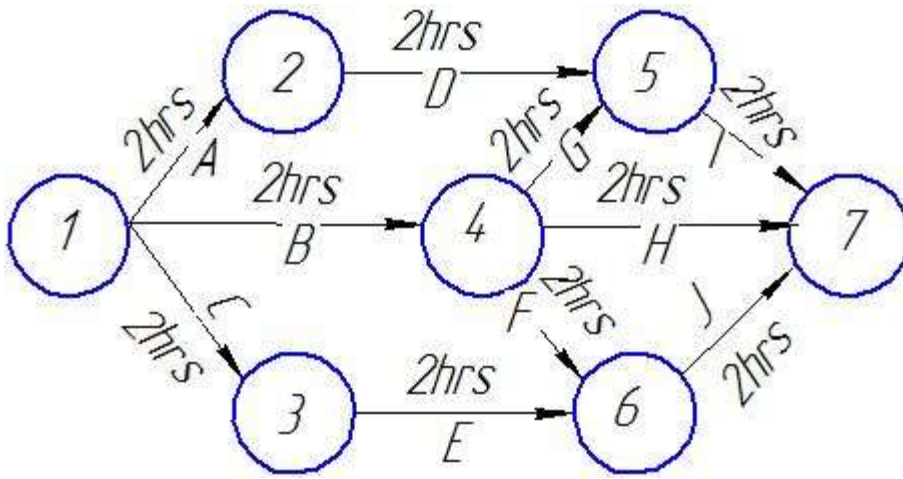
(5 marks)

b) Explain the various barriers of creative thinking.

(10 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) Discuss detailed design as a phase in the engineering design process. **(7 marks)**
- b) Explain the Gantt chart and Work Breakdown Structure as tools used in project planning **(6 Marks)**
- c) Discuss the human physical effort in ergonomics and how it has affected the design of products. **(7 marks)**

Question THREE

- a) Sketch a graph of product cost commitment during phases of the design process. **(6 marks)**
- b) Explain value analysis and value engineering in engineering design **(4 marks)**
- c) Discuss the design for manufacture guidelines. **(10 marks)**

Question FOUR

- a) Discuss the Guidelines for tolerance design **(8 marks)**
- b) Discuss Aesthetics as a primary component in Industrial design **(7 marks)**
- c) Explain the material condition modifiers used in Geometric Dimensioning and tolerancing. **(3 marks)**
- d) Explain the terms invention and innovation. **(2 marks)**

Question FIVE

- a) Explain the causes of unreliability in a designed product in use. **(10 marks)**
- b) Discuss the measurement of scales as a method of selecting the best design concept elaborating on the various scales used. **(10 marks)**