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TECHNICAL UNIVERSITY OF MOMBASA

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Faculty of Engineering and Technology  
Department of Mechanical & Automotive Engineering  
UNIVERSITY EXAMINATION FOR:  
BSc. Mechanical Engineering  
EMG 2415 : Research Methods  
END OF SEMESTER EXAMINATION  
SERIES: DECEMBER 2016  
TIME: 2 HOURS  
DATE: 5 Dec 2016

**Instructions to Candidates**

You should have the following for this examination

- *Answer booklet*
- *Non-Programmable scientific calculator*

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

Maximum marks for each part of a question are as shown.

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

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**Question ONE (Compulsory)**

- Explain the essential steps involved in defining a research problem. **(6 marks)**
- Define the term research and explain any **THREE** characteristics of research. **(5 marks)**
- State any **FIVE** Factors affecting Research Design **(5 marks)**
- Explain the following types of research:
  - Descriptive
  - Correlational
  - Explanatory
  - Exploratory **(8 marks)**
- State and explain briefly any **THREE** types of knowledge that research can add to. **(6 marks)**

**Question TWO**

- Define literature review as used in research and explain the **THREE** main sources of literature review. **(8 marks)**
- In the event of carrying out research studies a researcher reviews related literature of materials in relation to problem of the research, briefly explain the challenges that may be encountered during this review. **(4 marks)**
- State and explain briefly the steps involved in formulating literature review. **(8 marks)**

### **Question THREE**

- a. Briefly describe the steps involved in research process with suitable illustrations. **(16 marks)**
- b. State any FOUR major problems and constraints faced by researchers. **(4 marks)**

### **Question FOUR**

- a. Define the following terms:
  - i. Primary data
  - ii. Secondary data **(4 marks)**
- a. State and explain briefly THREE factors to consider during data collection. **(6 marks)**
- b. Explain the essential steps that a researcher should use in data collection. **(10 marks)**

### **Question FIVE**

- a. Outline the steps involved in qualitative data analysis **(8 marks)**
- b. State and explain briefly any FOUR data-presentation techniques. **(12 marks)**

Explain the essential steps involved in defining a research problem.

**(6 marks)**

**Solution**

- i. Identify a broad field or subject area of interest to you.
- ii. Dissect the broad area into sub areas.
- iii. Select what is of most interest to you.
- iv. Raise research questions.
- v. Formulate objectives.
- vi. Assess your objectives.

State any FIVE Factors affecting Research Design

**(5 marks)**

**Solution**

- Availability of sufficient information
- Availability of Data
- Time availability
- Proper exposure to the data source
- Availability of the money
- Manpower availability
- Magnitude of the problem
- Ability, knowledge, skill, technical understanding and technical background of the researcher

Identify any FOUR major problems and constraints faced by researchers in carrying out research study.

**(4 marks)**

**Solution**

Researchers are faced with several problems.

- Financial limitation
- Time limitation
- Equipment and materials
- Research participant's cooperation- letter form university
- Researchers/investigators research skills

Distinguish between Null hypothesis and alternative hypothesis.

**(4 marks)**

An alternative hypothesis is an assertion about a particular phenomenon that is, typically, derived from a theory. For example, we might assert that a particular independent variable will have an effect on a dependent measure. The research hypothesis (usually indicated by the symbol  $H_1$ ).

The null hypothesis by the symbol  $H_0$ ) is the statement that the treatment manipulation will not have any effect - that there is zero effect due to the independent variable. A null hypothesis is "the hypothesis that there is no relationship between two or more variables. The alternate, or research, hypothesis proposes a relationship between two or more variables.