



UNIVERSITY EXAMINATION 2021/2022
FOURTH YEAR SUPPLEMENTARY/SPECIAL EXAMINATION FOR THE DEGREE OF
BACHELOR OF ELECTRICAL AND ELECTRONIC ENGINEERING
EEE4209: RESEARCH METHODS

DATE: December 2021

TIME: 2 HOURS

Instructions

This examination paper contains **five** questions. Attempt **question one** and **any other two** questions. Question **ONE** is **compulsory** and carries **30 marks**. **All the other questions** carry **20 marks** each. **Neatness, good handwriting, clarity, and precise explanations** must be observed.

QUESTION ONE

- a) Define a good research. **[4 Marks]**
- b) What are the characteristics of a good research? **[5 Marks]**
- c) List 5 sources from where a researcher can identify a researchable topic. **[5 Marks]**
- d) What is a research proposal and how can it be useful document in conducting a research project in engineering? **[5 Marks]**
- e) A research process consists of a series of actions or steps necessary to effectively carry out a research and the desired sequencing of these steps. Discuss the steps that provide a procedural guideline regarding the research process. **[11 Marks]**

QUESTION TWO

- a) Describe the following types of Research; **[4 marks]**
 - 1) Applied research
 - 2) Quantitative research
 - 3) Qualitative research
 - 4) Experimental research
- b) What are the qualities of a good questionnaire? **[3 Marks]**
- c) A **variable** is a symbol of an event, act, characteristic, trait, or attribute that can be measured and to which we assign categorical values. Discuss the following different types of variables. **[3 Marks]**
 - 1) Independent variable
 - 2) Dependent variable
 - 3) Extraneous variable
- d) Describe five qualities of a good research objective. **[5 marks]**
- e) What are the considered factors in research design for a particular research problem? **[5 Marks]**

QUESTION THREE

- a) Compare the difference between exploratory and descriptive study. **[5 Marks]**
- b) Define the following terms in research;
1. Models
 2. Simulations
 3. Systems **[3 Marks]**
- c) List down some of the common mistakes made during proposal writing. **[4 Marks]**
- d) How does research methodology guide a researcher when carrying out a study? **[8 Marks]**

QUESTION FOUR

- a) What are the features of a good research design? **[4 marks]**
- b) Describe three exploratory techniques widely applicable for a management researcher? **[6 Marks]**
- c) Describe the two causes of incorrect inferences in a sampling procedure? **[4 Marks]**
- d) Census records of 56,300 people in a town show the following features.

Age	18 to 25	16%
	26 to 35	27%
	36 to 45	22%
	46 to 55	18%
	56 to 65	12%
	66 and over	5%
Gender	Female	53%
	Male	47%
Social class	A	13%
	B	27%
	C1	22%
	C2	15%
	D	23%

How best can you organise a quota sample of 1,200 people aged 18 to 25? Repeat for males aged 65 and over. **[6 Marks]**

QUESTION FIVE

- a) Describe the following descriptors of research design. **[10 Marks]**
- 1) Degree of research Question Crystallization
 - 2) Research control variables
 - 3) Time dimension
 - 4) Research environment
 - 5) Purpose of study
- b) Explain the three basic principles of experimental design. **[6 Marks]**
- c) Suppose that we want a sample size $n = 30$ to be drawn from a population of size $N = 8000$ which is divided into three strata of size $N_1 = 4000$, $N_2 = 2400$ and $N_3 = 1600$. Adopting proportional allocation, we shall get the sample sizes as under for the different strata: **[4 Marks]**