



# MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES  
DEPARTMENT OF PHYSICAL SCIENCES  
FOURTH YEAR SECOND SEMESTER EXAMINATION FOR  
BACHELOR OF EDUCATION (SPECIAL NEEDS)  
BACHELOR OF EDUCATION (SCIENCE)  
SPH 403: PRACTICAL PHYSICS II

DATE:

TIME:

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**INSTRUCTIONS:**

- Answer ALL the questions.

**QUESTION ONE (25 MARKS)**

- a) In designing an experiment to determine the specific heat capacity of a liquid using the electrical method, while giving reasons, describe any four assumptions that are made prior to the actual experiment? (10 marks)
- b) A 1.1 kg solid block of copper was used by a student to perform an experiment to determine the specific heat capacity. The readings obtained were as shown in Table 1.

*Table 1*

Time (s)	0	1	2	3	4	5	6	7	8	9	10	11	12	14
Temperature (K)	29	29.5	30	31	31.4	32	32.6	33	33.5	34.7	35.2	35.5	36.5	38
Energy emitted (J)	0	269	539	811	1066	1350	1610	1890	2158	2420	2690	2958	3234	3756

- i. On a graph paper, plot a relevant graph (7 marks)
- ii. Determine the specific heat capacity of Copper (8 marks)

### QUESTION TWO (25 MARKS)

In a “toss-die dice” experiment, the tabulated readings as recorded by students is as shown in Table 2.

Table 2

Nuclei Decay		Dice decay	
No. of undecayed nuclei	Time taken (hr)	No. of throws	No. of undecayed dice
1000	0	0	1000
846	1	1	833
717	2	2	694
607	3	3	579
513	4	4	482
435	5	5	402
368	6	6	335
311	7	7	279
264	8	8	233
223	9	9	194
189	10	10	162
160	11	11	135
135	12	12	112

- Plot separate graphs for the two scenarios (12 marks)
- Calculate the half-life of the dice (5 marks)
- Calculate the half-life of the nuclei (4 marks)
- While giving reasons, discuss the comparisons of values for part (b) and (c) above. (4 marks)

**QUESTION THREE (20 MARKS)**- To do an experiment in the laboratory on either vapor pressure of water or specific heat of zinc by methods of mixture