



**Instructions to candidates**

**Duration:** One(01) hour

**Number of questions:** Two(02) Essay Questions

**Mark allocation:** 100 mark (50 mark x2)

Use standard symbols without definition.

Scientific calculators are allowed.

**Answer all questions**

1.

a. Let  $A = \begin{pmatrix} 3 & 0 & 6 \\ 5 & -5 & 7 \\ 1 & 3 & -2 \end{pmatrix}$  and  $B = \begin{pmatrix} 2 & 2 & 3 \\ 10 & 0 & 5 \\ 6 & -1 & -5 \end{pmatrix}$ , find:

- i.  $A + B$  (02 mark)
- ii.  $2A$  (02 mark)
- iii. product of matrix  $A$  and matrix  $B$  (04 mark)
- iv. transpose of matrix  $A$  (03 mark)

b. Find the determinant of matrix  $C = \begin{pmatrix} 1 & 3 \\ -2 & 4 \end{pmatrix}$ . (04 mark)

c. Let  $Z_1 = 1 + 3i$  and  $Z_2 = 3 + 2i$ , find:

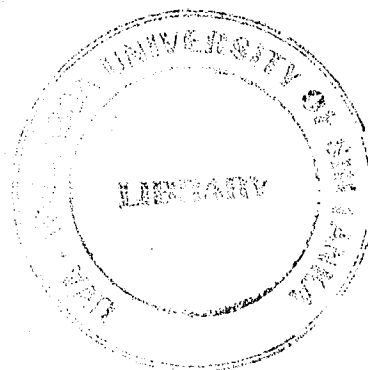
- i.  $Z_1 + Z_2$  (03 mark)
- ii.  $-3Z_1$  (03 mark)
- iii.  $Z_1 \times Z_2$  (04 mark)

2.

a. Describe each of the following sets using *Venn diagram*.

- i.  $A = \{2, 4, 6, 8, 10\}$  (03 mark)
- ii.  $B = \{\text{prime numbers less than } 15\}$  (03 mark)

b. List all the subsets of the set  $A = \{1, 2, 3\}$ . (02 mark)



c. If X, Y, and Z are three non-empty sets. Represent the following using the Venn diagrams by shading the relevant regions.

i.  $(X \cup Y) \cap (X \cup Z)$  (02 mark)

ii.  $(X \cap Y) \cap Z'$  (02 mark)

d. In a group of 70 cars tested by a garage in Badulla, 15 had faulty tires, 20 had faulty brakes and 18 exceed the allowable emission limits. Also, 5 cars had faulty tires and brakes, 6 failed on tires and emission, 10 failed on brakes and emissions, and 4 cars were unsatisfactory in all three respects.

i. Draw an appropriate Venn diagram. (08 mark)

ii. How many cars had no faults in these three checks? (05 mark)