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**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION AND ACTUARIAL SCIENCE**

**1ST YEAR 1ST SEMESTER 2016/2017 ACADEMIC YEAR**

**MAIN CAMPUS**

**COURSE CODE: SMA 100**

**COURSE TITLE: BASIC MATHEMATICS**

**EXAM VENUE: STREAM: BED AND ACT SCIENCE Y1S1**

DATE: EXAM SESSION:

TIME: 2.00 HOURS

**Instructions:**

1. **Answer question one (compulsory) and any other two questions.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE (30 MARKS)**

1. Verify the identity



(4marks)

1. Given and . Let be the following relation from $A$to $B$. $R=\{\left(1,y\right), \left(1,z\right), \left(3,y\right), \left(4,x\right), (4,z)\}$
2. Determine the arrow diagram of $R$ (2marks)
3. Find the inverse relation of $R$ (2marks)
4. Determine the domain and the range of $R$ (2marks)
5. Find the complex cube roots of . Leave your answer in polar form with the argument in degrees. (6marks)
6. A farmer buys $3$ cows, 2 pigs and 4 hens from a man who has 6 cows, 5 pigs and 8 hens. Find the number $m$ of choices that the farmer has. (4marks)
7. Find the coefficient of the term in  in the expansion of :

 (4marks)

1. Find the sum of the first seven terms of the series  correct to 4 significant figures. (4marks)
2. Solve  (2marks)

**QUESTION TWO (20 MARKS)**

1. Solve the system of equations below using Cramer’s Rule if it is applicable. If Cramer’s rule is not applicable say so:

(10marks)

1. Given that $A=\{1,2\}$ and $B=\{a,b,c\}$ Show that  (4 marks)
2. Using De Moivre’s theorem. Write in the standard form  (6 marks)

**QUESTION THREE(20 MARKS)**

1. Solve $4^{x}+2^{x+2}-12=0$ (5marks)
2. A ceramic tile flooris designed in the shapeof a trapezoid 20 feetwide at the base and 10 feet wide at the top. The tiles, 12 inches by 12 inches, are to be placed so that each successive row contains one less tile than the preceding row. How many tiles will be required? (5marks)

c) The expression $ax^{2}+bx+c$ is divisible by $x-1$, has remainder $2$ when divided by $x+1$ and has remainder $8$ when divided by $x-2$. Find the values of $a, b, c.$(5marks)

 d) Solve for in the range  for $3(1-cosθ)=2sin^{2}θ$ (5marks)

**QUESTION FOUR (20 MARKS)**

1. Find the power set of$S=\{1,2,3,4\}$ (4marks)
2. Let $U=\{1,2,3,….,8,9\}$ be the universal set and $A=\left\{1,2,3,4\right\}, B=\{2,4,6,8\}$and $C=\{3,4,5,6\}$. Find

i) (2marks)

ii)  (2marks)

iii) (2marks)

iv)$B\C$ (2marks)

1. Prove the De’ Morgans law  (4marks)
2. Draw the Venn diagram and shade the region corresponding to

 (4marks)

**QUESTION FIVE (20 MARKS)**

1. Coast Guard station Zulu is located 120 miles due westof station X-ray. A ship at sea sends an SOS call that is received by each station. The call to station Zulu indicates that the bearing of the ship from Zulu is ( east of north), the call to station X-ray indicates that the bearing of the ship from X-ray is (west of north).
2. How far is each station from the ship (5marks)

ii) If a helicopter capable of flying 200 miles per hour is dispatched from the nearest station to the ship, how long will it take to reach the ship. (5marks)

1. Use the method of elimination to solve the system of equation



 (10marks)