



**ANSWER ALL QUESTIONS**

**QUESTION 1: identify the proper term for each statement/definition: (14 Marks)**

1. \_\_\_\_\_ any mathematical statement that serves as a starting point from which other statements are logically derived. However, it not need be proved.
2. \_\_\_\_\_ a general proposition not self-evident but proved by a chain of reasoning; a truth established by means of accepted truths.
3. \_\_\_\_\_ is a valid argument in which the theorem is the conclusion.
4. \_\_\_\_\_ is a mathematical proof technique, most commonly used to establish a given statement for all natural numbers. It can be used to prove statements about any well-ordered set.
5. Let A and B be two sets. A \_\_\_\_\_ f from A to B, written  $f : A \rightarrow B$ , is a rule which associates to each  $a \in A$  a unique element  $f(a) \in B$ .
6. In an \_\_\_\_\_ function no two elements of the domain have the same image in the co-domain.
7. Given any set A, the set consisting of all subsets of A is called the \_\_\_\_\_.

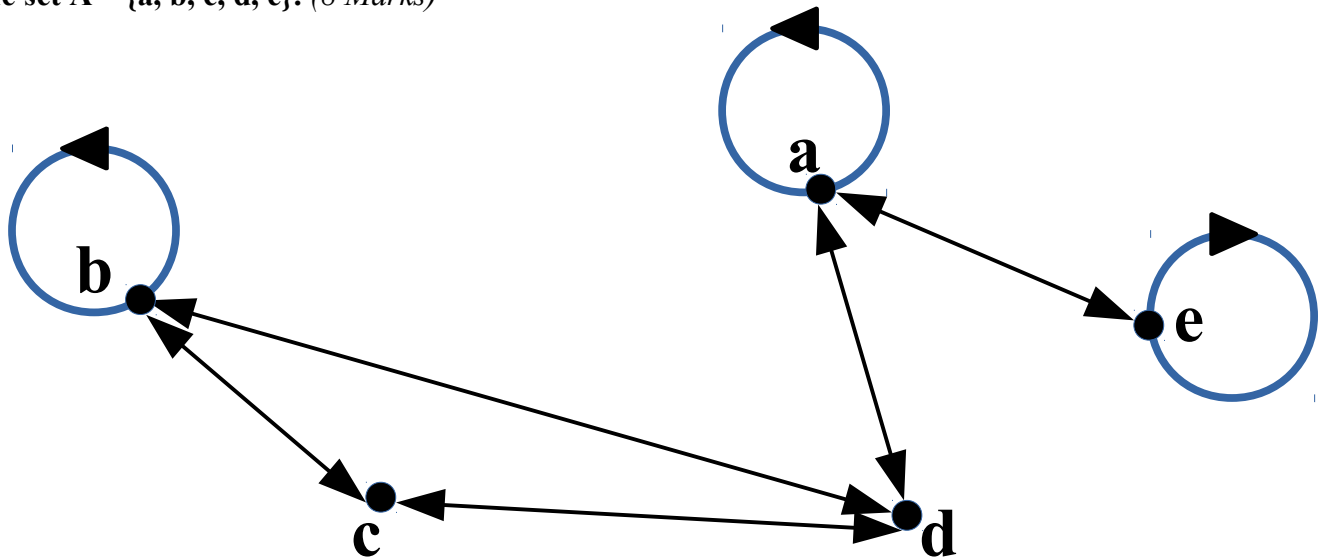
**QUESTION 2: Let  $A = \{a, b, c, d\}$  and a R a is  $R = \{(a, a), (a, b), (a, c), (b, a), (b, b), (b, c), (b, d), (d, d)\}$ . check and identify R satisfy *reflexive, symmetric, anti-symmetric, or transitive*. (4 Marks)**

**QUESTION 3: Prove that the sum of two consecutive integers is odd. (4 Marks)**

**QUESTION 4: Name the proper methods of mathematical proofs as shown in the table below. (8 Marks)**

<b>Method of proof</b>	<b>Assume</b>	<b>Deduce</b>
	<i>P; background knowledge</i>	<i>Q</i>
	<i>-Q; background knowledge</i>	<i>-P</i>
	<i>-P; background knowledge</i>	<i>A contradiction, f</i>
	<i>(a) P; background knowledge and (b) Q; background knowledge</i>	<i>Q P</i>

**QUESTION 5:** Check and identify the properties of relations for the following directed graph of a relation **R** on the set  $A = \{a, b, c, d, e\}$ . (8 Marks)



**QUESTION 6:** Let  $A = \{1, 2, 3\}$  and  $B = \{1, 2\}$ . Determine True or False for the following: (8 Marks)

1. $\emptyset \subseteq \mathcal{P}(A)$		2. $\emptyset \in \mathcal{P}(A)$	
3. $\{\{1\}, B\} \subseteq \mathcal{P}(A)$		4. $B \subseteq \mathcal{P}(A)$	
5. $A \subseteq \mathcal{P}(A)$		6. $A \in \mathcal{P}(A)$	
7. $B \in A$		8. $B \in \mathcal{P}(A)$	

**QUESTION 7: Prove by Contradiction, if  $3n+2$  is odd, then  $n$  is odd. (4 Marks)**

===== BEST WISHES =====