BRAC UNIVERSITY
Inspiring Excellence

**CSE 230 : DISCRETE MATHEMATICS**
**MID TERM EXAM : FALL 2016**
**TIME:1 HOUR MARKS:50**

**ANSWER ANY 05 (FIVE) OF THE FOLLOWING QUESTIONS**

**1.** Express the followings in terms of propositions and logical connectives (state the necessary propositions first) **[2.5x4=10]**
i) If David comes to the party then Bruno and Carlo come too.
ii) 4 is even because 4 is divisible by 2.
iii) Only one among Aldo, Bruno and Carlo passed the exam.
iv) Either Aldo is Italian and Bob is English, or neither Aldo is Italian nor Bob is English.

**2.** i) Check whether the following compound proposition is a tautology or contingency. **[5]**

$$(p \rightarrow q) \vee (p \rightarrow \neg q)$$

ii) Check and show whether the compound proposition of **Q.2(i)** and **p ↔ q** are logically equivalent or not ? **[5]**

**3**. i) If **n** is an integer then **4n+5** is odd **[7]**
ii) Mention the names of some of the proof strategies. **[3]**

**4.** A travel agent surveyed 100 people to find out how many of them had visited the cities of Melbourne and Brisbane. 31 people had visited Melbourne, 26 people had been to Brisbane, and 12 people had visited both cities. Find out the number of people who had visited: **[10]**

a. Melbourne or Brisbane
b. Brisbane but not Melbourne
c. Melbourne but not Brisbane
d. Only one of the two cities
e. Neither city

**5.** Let **f(x)** and **g(x)** are two functions of x. Now answer the following:

a. $f(x) = x^2$ where **f: R→R**

The set of **images** of this function = {100, 2, 20}

i. Find the set of **pre-images**. **[3]**
ii. Also find out if the function is **one-to-one**? **[2]**

b. $g(x) = |x - 2|$ where Domain={All integers} and Co-domain={All positive integers<10}
Now find out whether g(x) is **one-to-one** or **onto** or **both**? Explain your answer. **[5]**

**6.**

a. Add up the first 20 terms of the following series. **[5]**
**1 + 4 + 7 + 10 + 13 + ……**

b. Find the value of the following: **[5]**

$$\sum_{i=1}^{4} \sum_{j=2}^{4} ij$$