College of Business Peace Leadership and Governance

CSC 201 DISCRETE MATHEMATICS

END OF SEMESTER EXAMINATIONS

NOVEMBER/DECEMBER 2018

LECTURER: Mr. Luke Marwa

DURATION: (3 HRS)

INSTRUCTIONS

1. Answer all questions.

2. Total marks 100

Using laws of equivalence. Show that

$(p \wedge q) \rightarrow q$ is a tautology

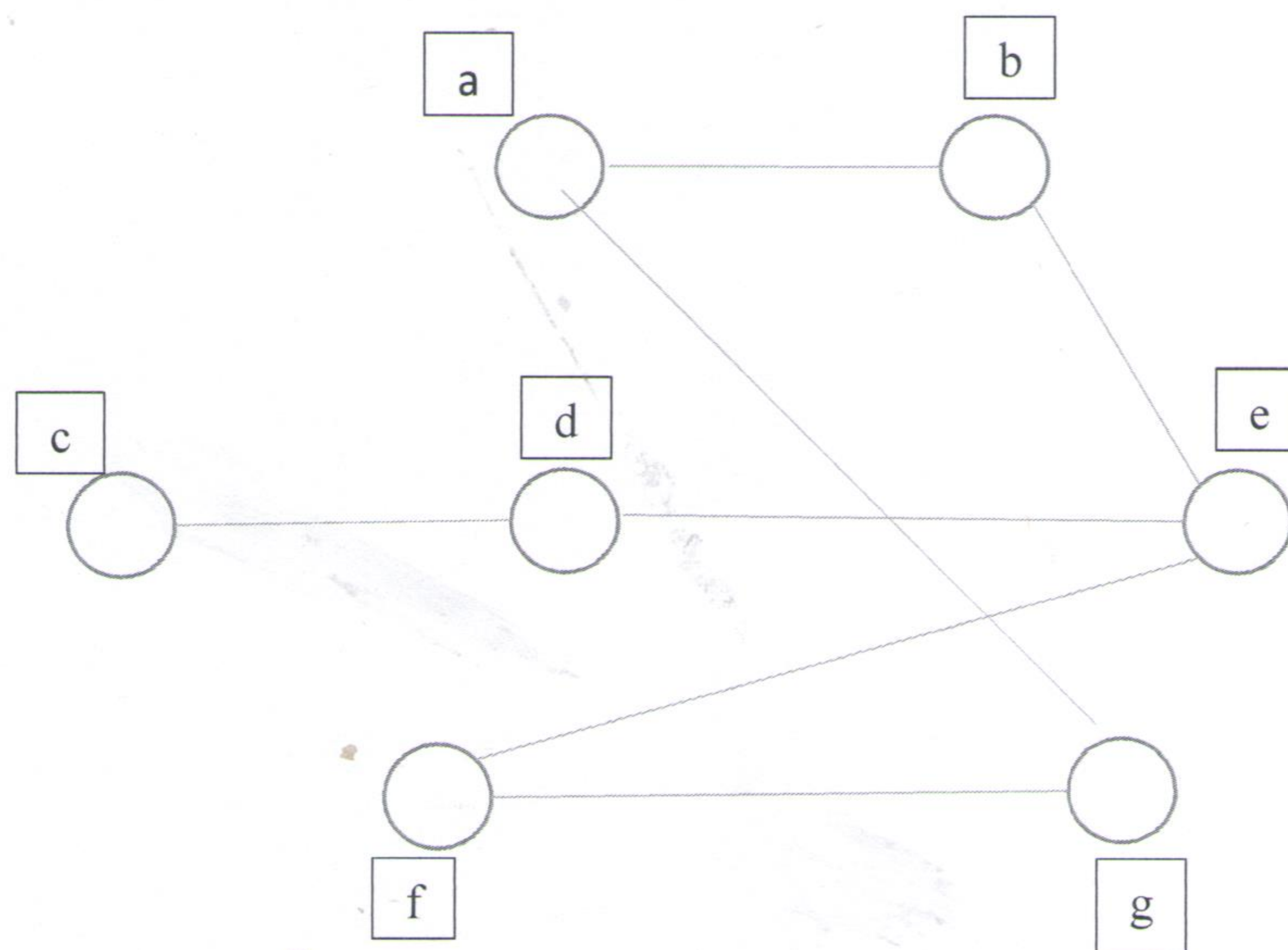$\neg(q \rightarrow p) \vee (p \wedge q) \equiv q$

$\neg(p \leftrightarrow q) \equiv (p \leftrightarrow \neg q)$

$P \wedge (p \vee q) \equiv p$

(5 + 5 + 5+ 5 marks)

Question 2

Study the following graph

a) Represent the graph as:

i.	Adjacency matrix	**(6 marks)**
ii.	Adjacency list	**(6 marks)**

b)   What is the degree of the graph   **(3 marks)**

Question 3

a) Write a recursive program to compute the Fibonacci sequence

b) Write a program to determine whether a number is prime or not

c) Write a recursive program that computes the factorial of the number n

d) Write a program that finds the maximum of three numbers a ,b and c

(5+5+5+5 marks)

Question 4

Suppose $a = 3880$ and $b = 7312$.

(a) Express a and b as products of primes.   (3 marks)

(b) Find gcd (a, b) and lcm(a, b).   (3 marks)

(c) Verify that lcm$(a, b) = |ab|/$ gcd(a, b).   (4 marks)

Question 5

Use the Euclidean algorithm to find the Greatest Common Divisor (gcd)

a) gcd (12, 22).

b) gcd (4411, 301).

c) gcd (1001,1331).

d) gcd (12345,54321).

e) gcd (1000, 5040).

f) gcd (7888,4060).   (20 marks)

g)Proof that: $(p \rightarrow r) \vee (q \rightarrow r) \equiv (p \wedge q) \rightarrow r$

Using the truth table below

p	q	r	p→r	q→r	(p→r) ∨ (q → r)	p ∧ q	(p ∧ q) → r
0	0	0					
0	0	1					
0	1	0					
0	1	1					
1	0	0					
1	0	1					
1	1	0					
1	1	1					

(15 marks)