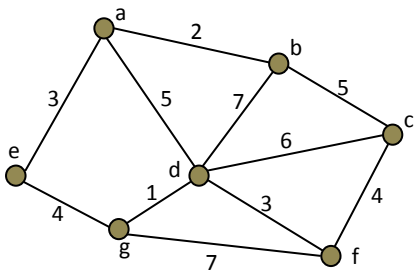
Discrete Mathematics Final Exam (Spring 2014)

No :
Name:

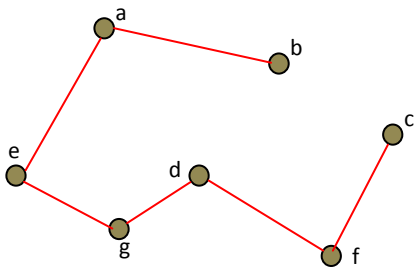
Edu-Type : 1 / 2

1. In the following graph, find minimal spanning tree by defining selection order of edges via

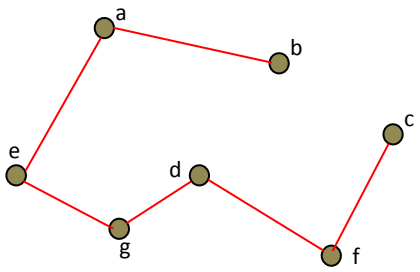
   i. (15*P*) Prim's algorithm.
   ii. (15*P*) Kruskal's algorithm.



i. (d-g), (d-f), (f-c), (e-g), (e-a), (a-b)

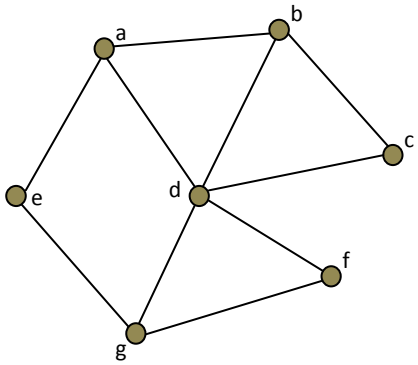


ii. (d-g) , (a-b), (e-a), (d-f), (f-c), (e-g)



2. The graph has a Hamilton circuit, but no Euler circuit. Draw a homeomorphic graph to the right one so that

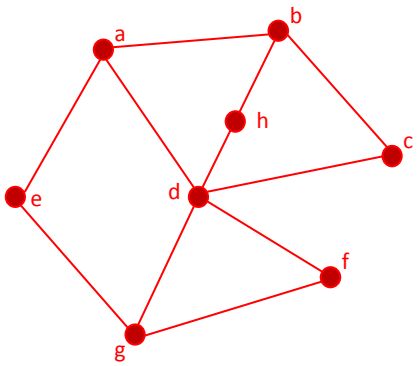
   i. (15*P*) it includes an Euler circuit.
   ii. (15*P*) it includes no Hamilton circuit.



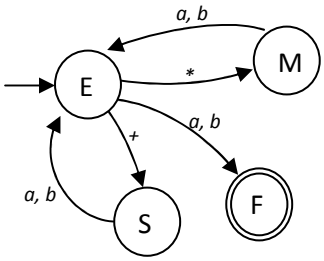
i.

Because reduction or subdivision does not change degrees of critical vertices, a homeomorphic graph which has an Euler circuit cannot be drawn.

ii.



3. According to finite state automaton transition diagram given on the right,



   i. (15P) Design the grammar rules.
   ii. (15P) Describe acceptable strings as a sentence.

i.	ii.
$E \rightarrow F \mid +FE \mid *FE$ $F \rightarrow a \mid b$	The strings which includes operations of * and + on variables of 'a' and 'b' in prefix notation are acceptable.

4. (10P) By using the Euclidean algorithm, find gcd(2730, 1729).

2730 = 1 * 1729 + 1001
1729 = 1 * 1001 + 728
1001 = 1 * 728 + 273
728 = 2 * 273 + 182
273 = 1 * 182 + 91
182 = 2 * 91 + 0

gcd(2730, 1729) = 91