Total No. of Questions – [04]

Total No. of Printed Pages 4

G.R. No.	

Paper Code - COMP - U218-121 (T2)
I.T. - U218-141 (T2)

OCTOBER 2018/ IN-SEM (T2)

S. Y. B. TECH. (COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY)

(SEMESTER - I)

COURSE NAME: DISCRETE STRUCTURES & GRAPH THEORY

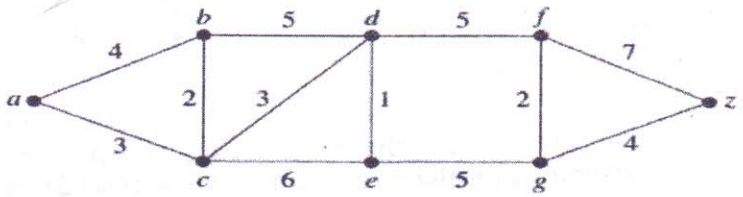
COURSE CODE: CSUA21171/ ITUA21171

(PATTERN 2017)

Time: [**1 Hour**] [Max. Marks: **30**]

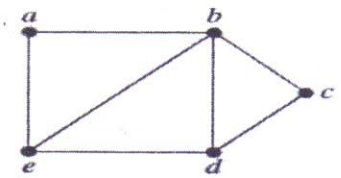
(*) Instructions to candidates:
1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a) Find the shortest path a and z using Dijkstra's shortest path algorithm [06]

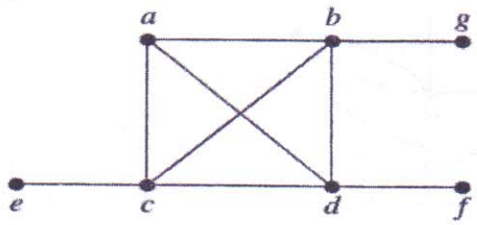


Q.1) b) Determine whether the given graph has a Hamilton circuit. If it does, find such a circuit. If it does not, give an argument to show why no such circuit exists. [06]

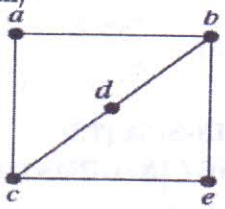
i)



ii)

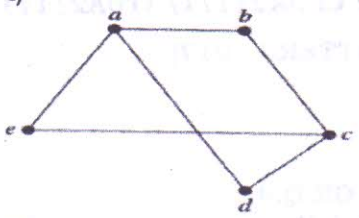


iii)

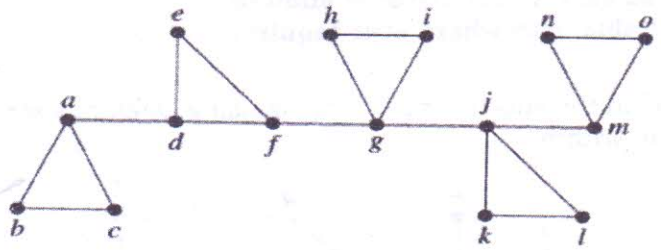


Q.1) c) Find the chromatic number for the following graphs [04]

i)



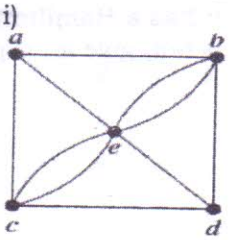
ii)



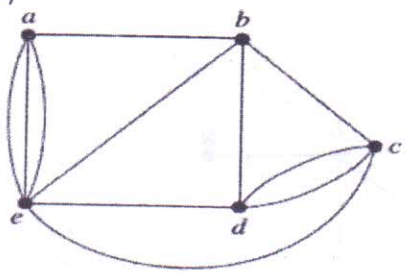
OR

Q.2) a) Determine whether the graph shown has an Euler circuit. Construct an Euler circuit if one exists. If no Euler circuit exists, determine whether the graph has an Euler path. Construct an Euler path if one exists. [06]

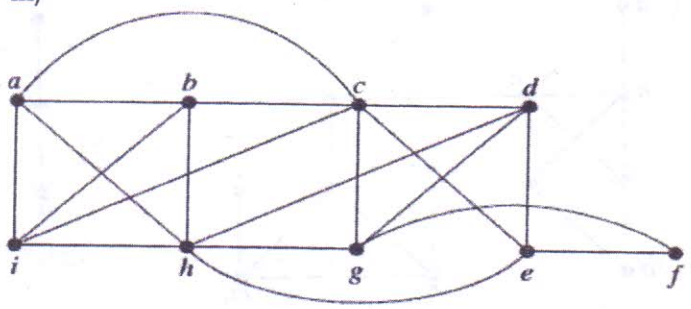
i)



ii)

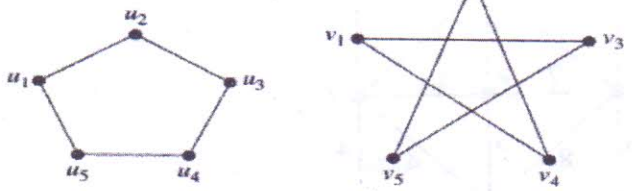


iii)

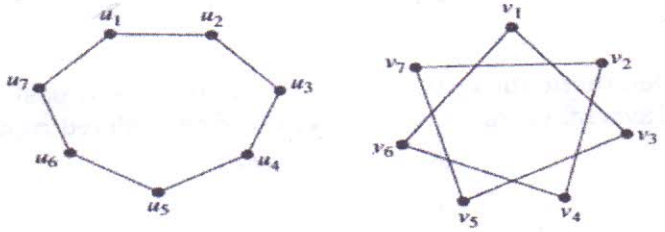


b) Determine whether the given pair of graphs is isomorphic. Exhibit an isomorphism or provide a rigorous argument that none exists. [06]

i)



ii)



c) i) Suppose that a connected planar graph has eight vertices, each of degree three. Into how many regions is the plane divided by a planar representation of this graph? [04]
ii) Suppose that a connected planar graph has six vertices, each of degree four. Into how many regions is the plane divided by a planar representation of this graph?

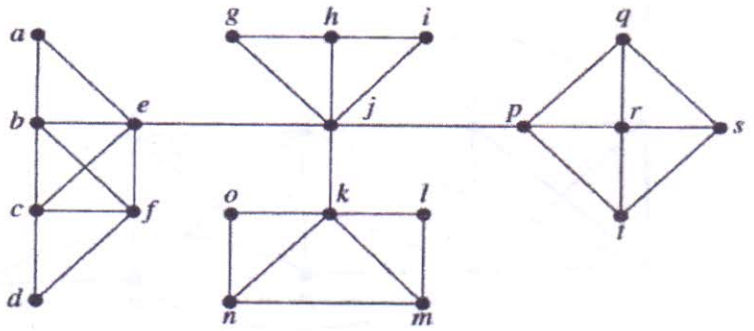
Q.3) a) Use Huffman coding to encode these symbols with given frequencies: A: 0.10, B: 0.25, C: 0.05, D: 0.15, E: 0.30, F: 0.07, G: 0.08. What is the average number of bits required to encode a symbol? [06]

Q.3) b) What is the value of each of these prefix expressions? [04]

i) $+ - \uparrow 3\ 2 \uparrow 2\ 3 / 6 - 4\ 2$

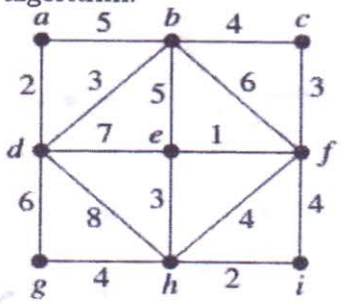
ii) $* + 3 + 3 \uparrow 3 + 3\ 3\ 3$

Q.3) c) Use depth-first search to produce a spanning tree for the given simple graph. Choose a as the root of this spanning tree and assume that the vertices are ordered alphabetically. [04]

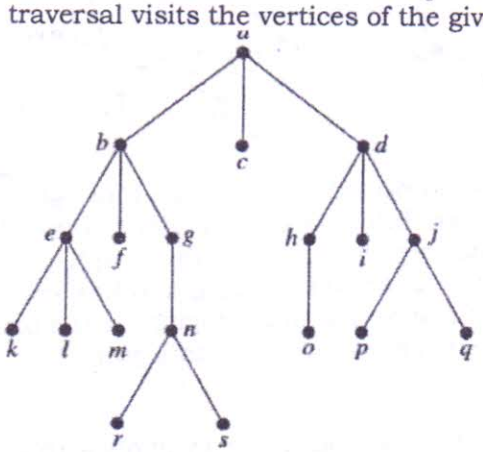


OR

Q.4) a) Construct a minimum spanning tree using Kruskal's algorithm. [06]



Q.4) b) Determine the order in which a pre-order and post-order traversal visits the vertices of the given ordered rooted tree. [04]



Q.4) c) Represent the expression *((x +2) ↑ 3) *(y −(3+x))* − 5 using a binary tree and write its prefix notation [04]