Comp-U218-121 (T2)
IT-U218-141 (T2)

Total No. of Questions – [04] Total No. of Printed Pages 3 0 1

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) Marking Scheme

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

Q.1)	a)	Apply Each step 1 m	3
Q.1)	b)	Analyze Each sub question 2 marks 1 mark for determining Hamilton circuit existence and 1 mark for circuit or reason for non-existence	3
Q.1)	c)	Apply Each sub question 2 marks 1 mark for chromatic number and 1m for justification	3
		OR	
Q.2)	a)	Analyze Each sub question 2 marks 1 mark for determining Euler circuit/ path existence and 1 mark for circuit/ path or reason for non-existence	3
	b)	Apply Each sub question 3 marks, 1 mark for criteria of isomorphism, 2 mark 1-to-1 vertex mapping	3
	c)	Apply Each sub question 2 marks	3
Q.3)	a)	Analyze 5 marks for Huffman coding, 1 m for average number of bits	4
Q.3)	b)	Analyze 2 marks for each sub question	4
Q.3)	c)	Apply 4 marks for spanning tree using DFS	4
		OR	
Q.4)	a)	Analyze 1 mark for each step in MST, 1 mark for total cost	4
Q.4)	b)	Apply Each traversal 2 marks	4
Q.4)	c)	Apply Binary expression tree 2 marks, Polish notation 2 marks	4

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Total No. of Questions – [04] Total No. of Printed Pages 5

G.R. No.	

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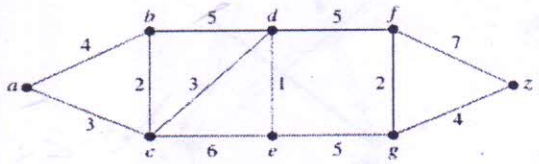
Model Answer

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

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



$T = \{a, b, c, d, e, f, g, z\}$ $P = \{\phi\}$

$v = a$.

$L(b) = \min\{\infty, 0+4\} = 4$

$L(c) = 3$, $L(d) = L(e) = L(f) = L(g) = L(z) = \infty$

$v = c$

$L(b) = 4$, $L(e) = 9$, $L(d) = 6$,

$L(f) = L(g) = L(z) = \infty$

$v = b$

$L(d) = 9$, $L(e) = 9$, $L(f) = \infty$

$L(g) = \infty$, $L(z) = \infty$

$v = d$

$L(e) = 9$, $L(f) = 14$, $L(g) = \infty$, $L(z) = \infty$

$v = e$

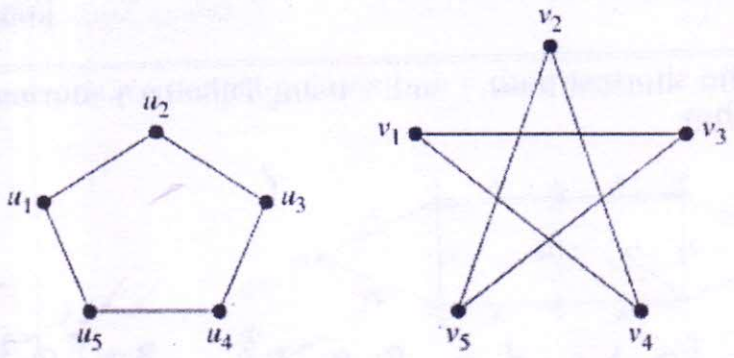
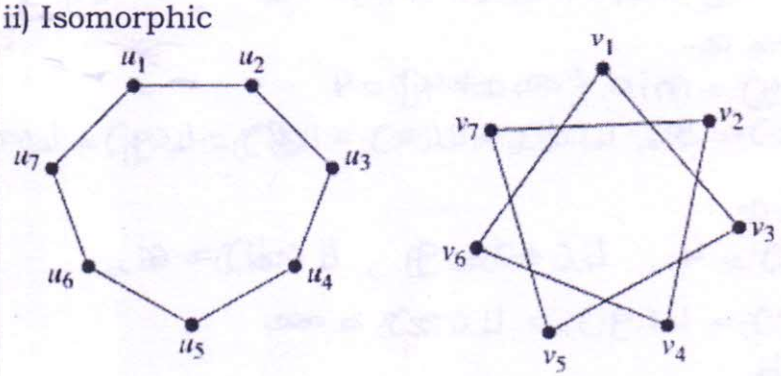
$L(f) = 14$, $L(g) = 14$, $L(z) = \infty$

$v = f$

$L(g) = 14$, $L(z) = 21$

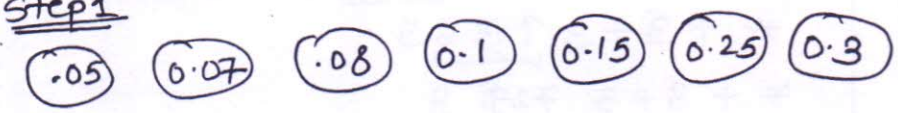
$v = g$

$L(z) = 18$

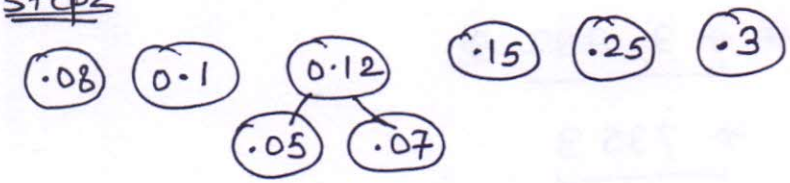
Q.1)	b)	*i) a, b, c, d, e, a* is a Hamilton circuit. ii) No Hamilton circuit exists, because once a purported circuit has reached *e* it would have nowhere to go. iii) No Hamilton circuit exists, because every edge in the graph is incident to a vertex of degree 2 and therefore must be in the circuit	[06]
Q.1)	c)	i) 2 ii) 3	[04]
		OR	
Q.2)	a)	i) No Euler circuit but a Euler Path; *a, e, c, e, b, e, d, b, a, c, d* *ii) Euler Circuit a, b, c, d, c, e, d, b, e, a, e, a* *iii) Euler Circuit a, i, h, g, d, e, f, g, c, e, h, d, c, a, b, i, c, b, h, a*	[06]
	b)	i) Isomorphic  ii) Isomorphic  	[06]
	c)	r=e-v+2 i) v=8 Degree of each vertex is 3 2e= sum of degree = 8x3=24 e=12 r=e-v+2=12-8+2=6 ii) 2e=6x4=24 e=12 r=e-v+2=12-6+2=8	[04]
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	[06]

encode a symbol?

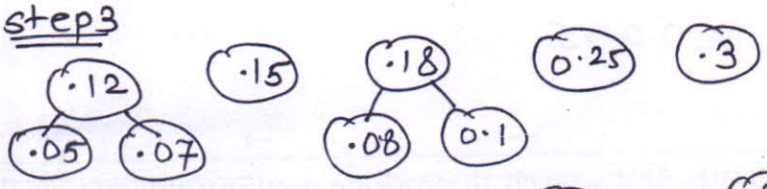
step1



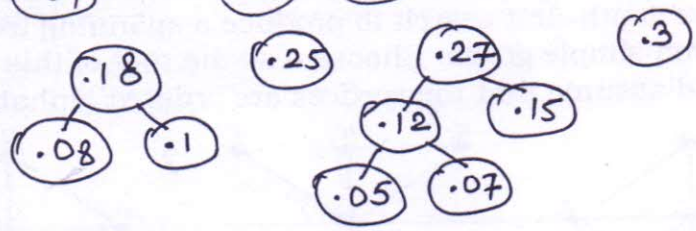
step2



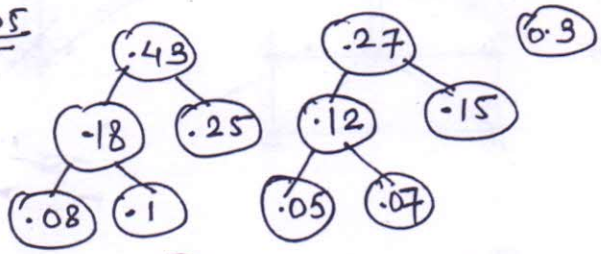
step3



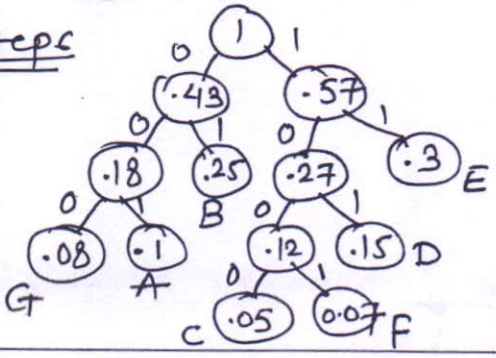
step4



step5



step6



Average No. of bits = $0.08 \times 3 + 0.1 \times 3 + 0.25 \times 2 + 0.05 \times 4 + 0.07 \times 4 + 0.15 \times 3 + 0.3 \times 2$

$= 2.57$ bits.

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) $* + 3 + 3 \uparrow 3 + 3\,3\,3$

i) $+ - \uparrow 32 \uparrow 23/6-42$

$+ - \uparrow 32 \uparrow 23/62$

$+ - \uparrow 32 \uparrow 233$

$+ - \uparrow 32\,8\,3$

$+ - 9\,8\,3$

$+ 1\,3$

$= 4$

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

$* + 3 + 3 \uparrow 3 6 3$

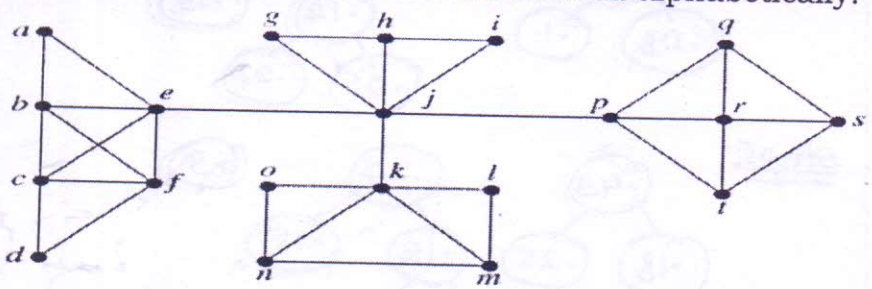
$* + 3 + 3 \; 729 \; 3$

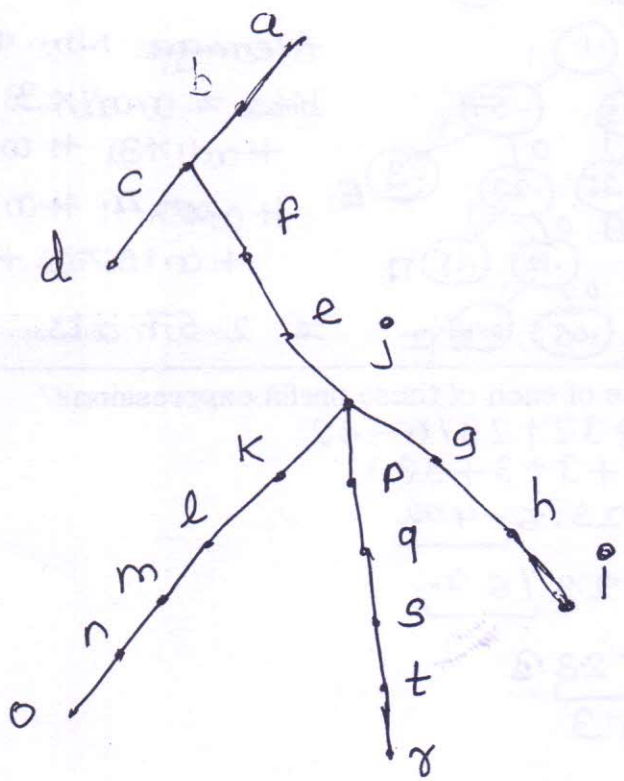
$* + 3 \; 732 \; 3$

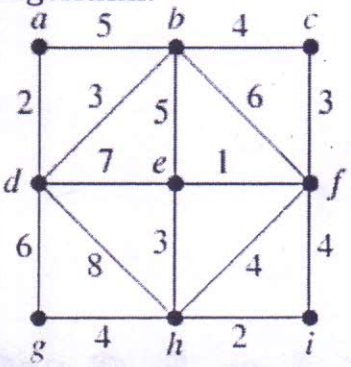
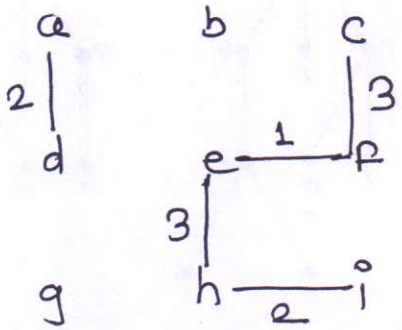
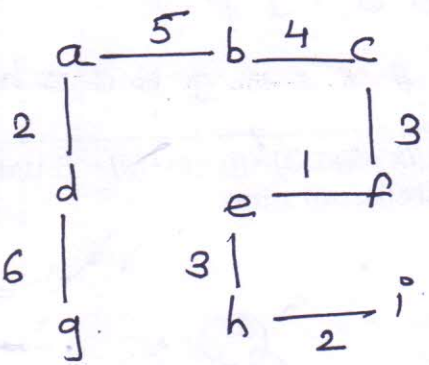
$* \; 735 \; 3$

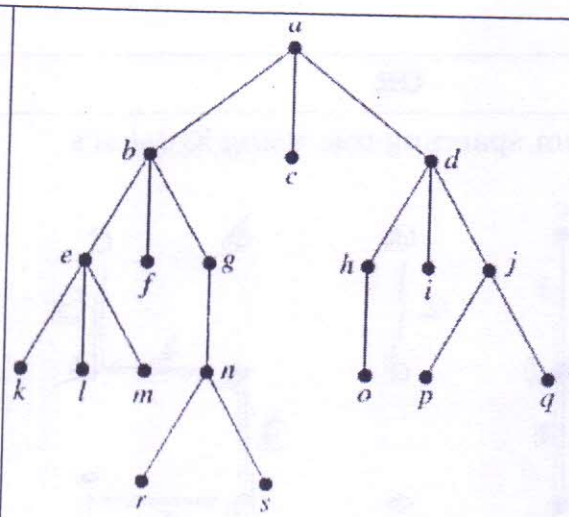
$= 2205.$

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]





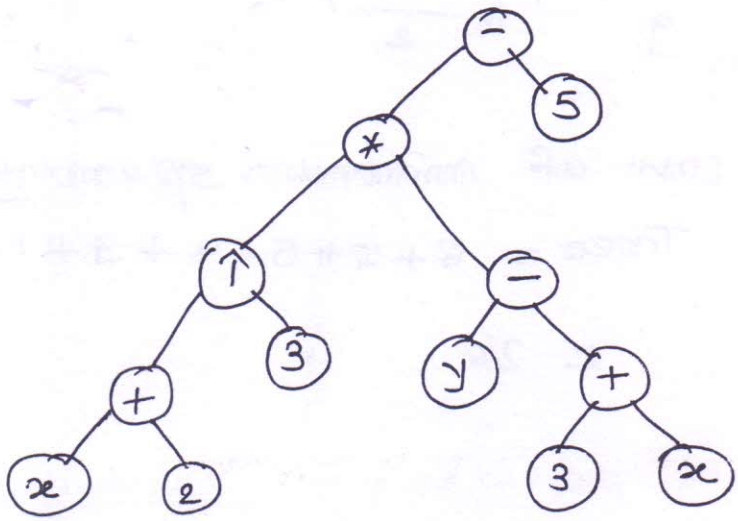
		OR	
Q.4)	a)	Construct a minimum spanning tree using Kruskal's algorithm.    cost of minumum spanning Tree = 6+2+5+4+3+1+3+2 = 26.	[06]
Q.4)	b)	Determine the order in which a pre-order and post-order traversal visits the vertices of the given ordered rooted tree.	[04]



Preorder = u b e k l m f g n r s c d h o i j p q

Postorder = k l m e f r s n g b c o h i p q j d u

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



Prefix notation = - * ↑ + x 2 3 - y + 3 x 5