G.R. No.	

Paper Code - COMPUTER - U218-121 (BE-FS)
P.T. - U218-141 (BE-FS)

May 2019/ENDSEM

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

(SEMESTER - I)

COURSE NAME: DISCRETE STRUCTURES & GRAPH THEORY

COURSE CODE: CSUA21171/ ITUA21171

(PATTERN 2017)

Time: [2 Hours]   [Max. Marks: 50]

(*) Instructions to candidates:
1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed
4) Use suitable data where ever required

Q1) a) i) Show that $p \rightarrow q$ and $\neg q \rightarrow \neg p$ are logically equivalent.   [06]
         ii) Show that $\neg p \leftrightarrow q$ and $p \leftrightarrow \neg q$ are logically equivalent.

OR

b) Prove that for every positive integer n,   [06]
$1 \cdot 2 + 2 \cdot 3 + \cdots + n(n + 1) = n(n + 1)(n + 2)/3$.

Q2 a) Determine the relation in the following graph is an equivalence relation   [06]
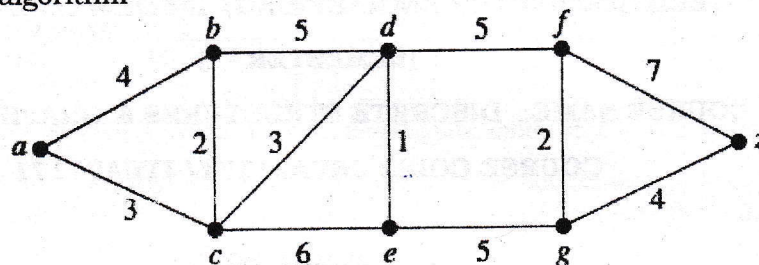   i)   ii)
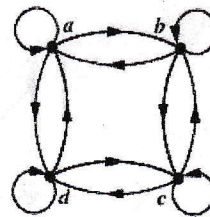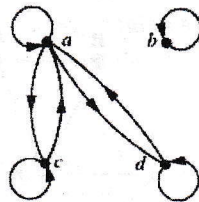
OR

b) Determine whether each of these functions from Z to Z is onto.   [06]
   a) $f(n) = n - 1$
   b) $f(n) = n^2 + 1$
   c) $f(n) = n^3$
   d) $f(n) = n^2$

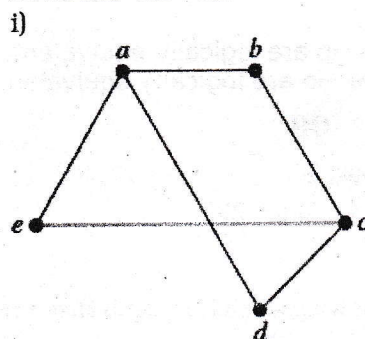**Q3)** a) Find the shortest path a and z using Dijkstra's shortest path [06]
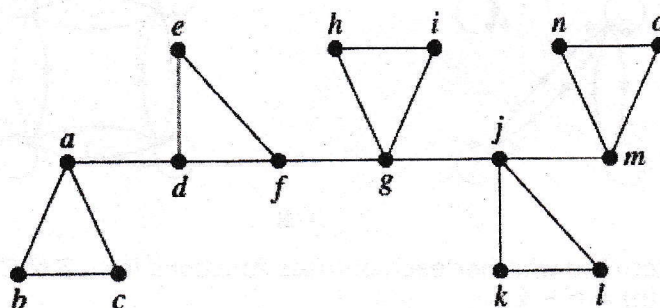algorithm

OR
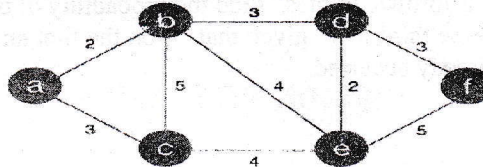
b) Find the chromatic number for the following graphs [06]
i)

ii)

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Q4) **a)** What is the value of each of these prefix expressions? [04]

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

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

OR

b) Find the minimum spanning tree using Prim's algorithm [04]

Q5) **a)** Find the number of words, with or without meaning, that can be formed with the letters of the word 'CHAIR'. [06]

b) What is the coefficient of $x^{101} y^{99}$ in the expansion of $(2x - 3y)^{200}$? [04]

c) A box contains three pairs of socks colored red, blue, and white, respectively. Suppose I take out the socks without looking at them. How many socks must I take out to be sure that they will include a matching pair? [04]

OR

Q6) **a)** If five digits 1, 2, 3, 4, 5 are being given and a three digit code has to be made from it if the repetition of digits is allowed then how many such codes can be formed. [06]

b) Let us suppose we have 12 adults and 10 kids as an audience of a certain show. Find the number of ways the host can select three persons from the audiences to volunteer. The choice must contain two kids and one adult. [04]

c) How many students do you need in a school to guarantee that there are at least 2 students who have the same first two initials? [04]

Q7) **a)** A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is 6. Find the probability that it is actually a six. [06]

b) Let the pair of dice be thrown and the random variable X is the sum of the numbers that appear on the two dice. Find mean or expectation of X. [04]

c) :Bag I contains 4 white and 6 black balls while another Bag II contains 4 white and 3 black balls. One ball is drawn at random from one of the bags and it is found to be black. Find the probability that it was drawn from Bag I. [04]

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Q8   a) Find the mean deviation about the median of the following [06] distribution:

Marks obtained	10	11	12	14	15
No. of students	2	3	8	3	4

b) If a fair coin is tossed 10 times, find the probability of at least 5 heads.   [04]

c) A die is thrown 3 times. Find the probability of occurrence of [04] "4 on the third row" given that "6 on the first and 5 on the second throw" has already occurred.