



There are **5 (Five)** questions. Answer **all 5 (Five)** questions. All questions are of values indicated on the right-hand margin.

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- The diagram shows a network of 11 nodes labeled A through K. The connections are as follows:
- A is connected to B, C, K, and L.
  - B is connected to A and C.
  - C is connected to A, B, D, L, and M.
  - D is connected to C and E.
  - E is connected to D and F.
  - F is connected to E, G, and N.
  - G is connected to F and H.
  - H is connected to G, I, L, and M.
  - I is connected to H and J.
  - J is connected to I and K.
  - K is connected to A, J, and L.
  - L is connected to A, C, H, I, K, and M.
  - M is connected to C, H, and N.
  - N is connected to M, F, and G.

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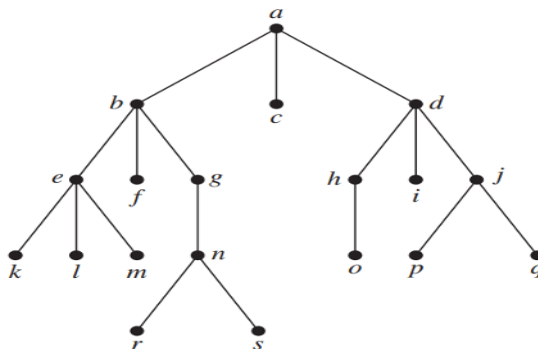
- $$\frac{1}{2 \times 5} + \frac{1}{5 \times 8} + \frac{1}{8 \times 11} + \dots + \frac{1}{(3n - 1)(3n + 2)} = \frac{n}{6n + 4}$$

- Q4. a.** Form a binary search tree for the word's mathematics, physics, geography, radiology, technology, meteorology, geology, criminology, psychology, neurology, chemistry, and terminate (using alphabetical order). **[2]**



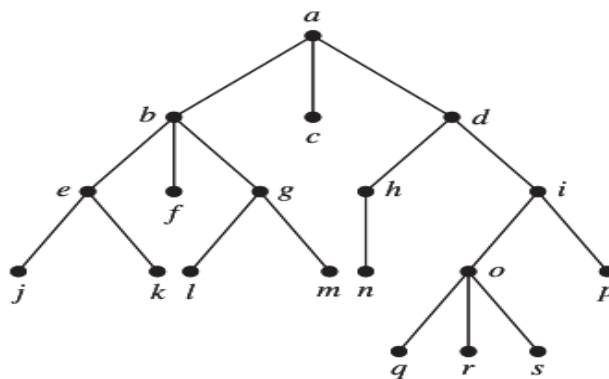
**Q4. b.** Is the tree you constructed in Q4. (a) balanced tree? Explain with proper justification. What is the maximum limit of the number of leaves in this tree? [1+1]

**Q4. c.** Traverse the following tree using post-order technique. You must show all the steps in the process. [2.5]



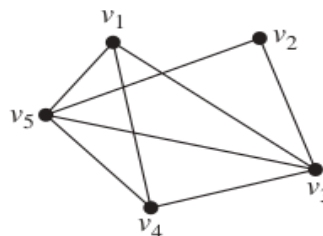
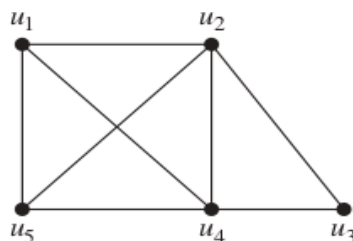
**Q4. d.** Represent the expression  $x + ((x*y + x)/y)$  using binary tree. Write the expression in prefix notation. Evaluate the prefix expression that you created using values of  $x = 4$ , and  $y = 3$ . [1+1 +0.5]

**Q5. a.** Is the rooted tree in the figure a full  $m$ -ary tree for some positive integer  $m$ ? If yes, what is the possible value of  $m$ ? If not, how can you make it a full  $m$ -ary tree? [1+2]



**Q5. b.** A full  $m$ -ary tree has 136 vertices. Among them, 109 are leaves. Calculate the values of  $m$ , and the number of edges in the tree. [2]

**Q5. c.** Find the degree sequences of both the graphs. Determine whether the given pair of graphs is isomorphic. [3]



Good Luck