[3 hours] **[80 Mks]**

NB : 1) Question 1 is compulsory.
2) Attempt any three questions from the remaining questions.
3) Assume suitable data wherever applicable.

1 Solve any four out of following 20

(a) Explain what characteristics of social media makes it suitable for Big Data.

(b) Explain the collaborative filtering based recommendation system.

(c) What are three Vs of Big Data? Give two examples of big data case studies. Indicate which Vs are satisfied by these case studies.

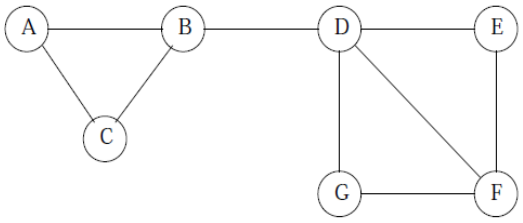
(d) Explain CAP theorem and explain how NoSQL systems guarantees BASE property.

2 (a) Explain the distributed storage system of Hadoop with the help of a neat diagram.. 10

(b) Discuss Matrix-Matrix Multiplication. Perform Matrix Multiplication with 1-step Map Reduce method. 10

$$\begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix} \quad * \quad \begin{matrix} 5 & 6 \\ 2 & 3 \end{matrix}$$

3 (a) For the graph given below use Clique percolation and find all communities 10



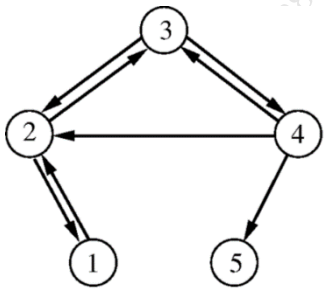
(b) Give two applications for counting the number of 1's in a long stream of binary values. Using a stream of binary digits, illustrate how DGIM will find the number of 1's. 10

4 (a) Explain Grouping and Aggregation algorithm using MapReduce. Support your answer with a suitable example. 10

(b) Explain the types of NoSQL data stores and their typical usage. 10

5 (a) Explain clearly with diagrams the PCY method of finding frequent itemsets (pairs) in a large data set. 10

(b) Recall HITS algorithm. Generate Hub and Authority score after 2 iterations for the graph given here. 10



6 (a) Suppose a data stream consists of integers 1,3,5,4,6,1,5,9,3,2. Let the hash function used be: 10

i) h(x)= x+1 mod 16

ii) h(x)= 2x+3 mod 16

iii) h(x) = 3x + 1 mod 16

Show how the Flajolet-Martin algorithm will estimate the number of distinct elements in the stream.

(b) Explain CURE algorithm, clearly stating its advantages over traditional clustering algorithm. 10

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