

# CBCS SCHEME

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16/17SCS/SCE21

## Second Semester M.Tech. Degree Examination, June/July 2018 Managing Big Data

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Define Big data and explain the importance of Big data in modern world. (05 Marks)
- b. Define unstructured data and explain the advanced analytics used in data mining and simulation. (06 Marks)
- c. Define and explain Digital Marketing and Web analytics in detail. (05 Marks)

OR

- 2 a. What is cross-channel lifecycle marketing approach explain with a neat diagram. (06 Marks)
- b. Explain Near Real time event processing framework for fraud detection with the help of neat diagram. (06 Marks)
- c. What is crowd sourcing analytics? Explain. (04 Marks)

### Module-2

- 3 a. Explain aggregate data model with an example. (08 Marks)
- b. Explain relationships and graph database in detail. (08 Marks)

OR

- 4 a. What is sharding? Explain in detail. (06 Marks)
- b. Explain Basic partitioning and combining map reduce techniques. (10 Marks)

### Module-3

- 5 a. Explain map and reduce phase with an example. (06 Marks)
- b. Briefly explain the significance of data flow in distributed file system. (06 Marks)
- c. What are Hadoop pipes? Explain. (04 Marks)

OR

- 6 a. What is Hadoop distributed file system and Briefly explain its design. Where HDFS is not a good fit today? (08 Marks)
- b. Explain serialization and its RPC-formats with an example. (08 Marks)

### Module-4

- 7 a. What are map reduce work flows and how a problem is decomposed into jobs by using map reduce? Explain with an example. (08 Marks)
- b. Explain Job run and independent entities for a classic map reduce. (08 Marks)

OR

- 8 a. What is job scheduling? Explain Fair scheduler and capacity scheduler. (08 Marks)
- b. Explain input format class hierarchy with a neat diagram. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-5**

- 9 a. Explain clusters, key spaces and columns with respect to Cassandra data model. (08 Marks)  
b. List and explain the design differences between RDBMS and Cassandra. (08 Marks)

**OR**

- 10 a. Write a short note on pig in Hadoop. (05 Marks)  
b. Write a short note on Hbase data model. (05 Marks)  
c. Write a short note Hive data types. (06 Marks)

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16/17SCS22

## Second Semester M.Tech. Degree Examination, June/July 2018 Advances in Computer Networks

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. List and explain the requirements that influence the network design. (10 Marks)
- b. Suppose a 128 Kbps point to point link is set up between earth and a rover on mars. The distance from earth to mars is approximately 55 Gm and data travels over the link at the speed of light  $3 \times 10^8$  m/sec.
  - i) Calculate the minimum RTT for the link
  - ii) A camera on the roller takes pictures of its surroundings and sends to earth. How quickly after a picture is taken can reach on earth? Assume that each image is 5 MB in size. (06 Marks)

OR

- 2 a. With a neat time line diagram, explain the four different scenarios for stop and wait algorithm. (08 Marks)
- b. Explain 5 layer TCP/IP reference model with a neat diagram. (08 Marks)

### Module-2

- 3 a. Describe virtual circuit switching with example. (08 Marks)
- b. Explain how bridges use spanning tree algorithm to handle loops. Give an example. (08 Marks)

OR

- 4 a. Describe different fields of IPV4 header format with a neat diagram. (10 Marks)
- b. What is the need for DHCP? Explain the working of DHCP. (06 Marks)

### Module-3

- 5 a. Explain distance vector routing protocol with an example network. (10 Marks)
- b. For the network shown in Fig.5(b), show how link state algorithm builds the routing table for node A. (06 Marks)

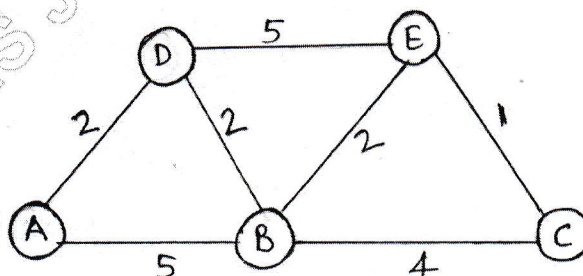


Fig.Q5(b)



**OR**

- 6 a. Briefly explain about BGP characteristics. (10 Marks)  
b. What are the general characteristics of mobile IP technology? (06 Marks)

**Module-4**

- 7 a. Briefly explain about different "TCP congestion control" mechanisms. (08 Marks)  
b. Explain the following queuing disciplines : i) FIFO ii) Fair queuing. (08 Marks)

**OR**

- 8 a. With a neat diagram explain three-way hand shake algorithm used by TCP to establish and terminate connection. (08 Marks)  
b. Explain UDP segment format. Mention the advantages and disadvantages of using UDP. (08 Marks)

**Module-5**

- 9 a. What are the different characteristics of HTTP explain in brief. What is the purpose of GET command in HTTP? (10 Marks)  
b. Explain the mechanism for mapping domain names to addresses. (06 Marks)

**OR**

- 10 a. Briefly explain about different congestion avoidance mechanisms. (10 Marks)  
b. What is URL? Explain with example. (06 Marks)

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16/17SCS23

## Second Semester M.Tech. Degree Examination, June/July 2018 Advanced Algorithms

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Explain the following asymptotic notations:  $O$ ,  $\Omega$ ,  $\theta$  with suitable examples. (06 Marks)
- b. Using master method, solve the following recurrences:
- i)  $T(n) = 9T(n/3) + n$       ii)  $T(n) = 2T(n/2) + \theta(n)$       iii)  $T(n) = 3T(n/4) + n \lg n$
- iv)  $T(n) = 8T(n/2) + \theta(n^2)$       v)  $T(n) = T(2n/3) + 1$  (10 Marks)

OR

- 2 a. Using substitution method, solve the following recurrence relation to give an upper and lower bound:  $T(n) = 2T(n/2) + \theta(n)$ . (05 Marks)
- b. Construct a recursion tree for the recurrence,  $T(n) = T(n/3) + T(2n/3) + cn$  and indicate the running time. (05 Marks)
- c. Explain the aggregate analysis technique used in amortized analysis, using multipop stack and binary counter problems. (06 Marks)

### Module-2

- 3 a. Write Bellman-Ford algorithm for solving single-source shortest paths problems. Trace it for the following graph.

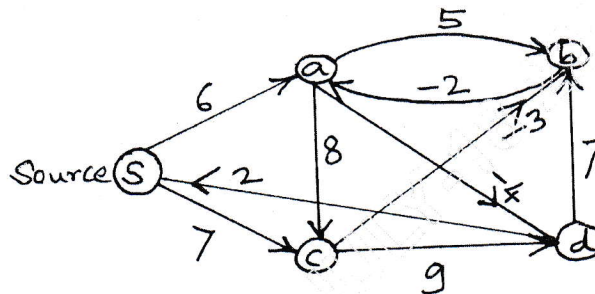


Fig.Q3(a)

- b. Briefly explain the following:
- i) Flow networks      ii) Residual networks
- iii) Cuts      iv) Augmenting paths (08 Marks)

OR

- 4 a. Write Johnson's algorithm for solving all pair shortest paths problem. Also indicate the running time. (05 Marks)
- b. Describe how to find maximum bipartite matching for a given graph, considering suitable example. (05 Marks)
- c. Write and explain recursive – FFT algorithm. (06 Marks)

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**Module-3**

- 5 a. Write modular-linear-equation-solver algorithm and using the same, solve the following:  
 $14x \equiv 30 \pmod{100}$ . (08 Marks)
- b. Apply the Chinese remainder theorem, to the following equations:  
 $a \equiv 2 \pmod{5}$   
 $a \equiv 3 \pmod{13}$   
 Generate all the solutions, in the form of a table. (08 Marks)

**OR**

- 6 a. With the help of suitable example, describe Pollard's rho heuristic algorithm. (08 Marks)
- b. Write the procedure for RSA public-key crypto system. Apply it for the following input  
 $p = 3$  and  $q = 11$ ,  $e = 7$ . Compute 'd' and encrypt  $M = 2$ . (08 Marks)

**Module-4**

- 7 a. Working modulo  $q = 13$ , demonstrate Robin-Karp string matching algorithm for the text: 2359023141526739921 and the pattern: 31415. (08 Marks)
- b. Write compute-transition function of string matching automata. Illustrate the same for the pattern: ababaca over the alphabet  $\Sigma = \{a, b, c\}$ . (08 Marks)

**OR**

- 8 a. Write compute-prefix function of Knuth-Morris-Pratt string matching algorithm. Apply it on the pattern AAACAAAAC. Indicate the running time of K-M-P algorithm. (08 Marks)
- b. Write Boyer-Moore algorithm for string matching problem. Illustrate it on the following input.  
 Text: BESS\_KNEW\_ABOUT\_BAOBABS  
 Pattern: BAOBAB (08 Marks)

**Module-5**

- 9 a. Describe how to randomize the deterministic algorithms considering the following problems:  
 i) Linear search algorithm  
 ii) Quick sort algorithm (08 Marks)
- b. Write and explain, Monte-Carlo algorithm for testing polynomial equality, with the help of a suitable example. (08 Marks)

**OR**

- 10 a. Describe Las Vegas algorithm for the problem of searching a list with repeated elements. Also list the differences between Monte-Carlo and Las-Vegas algorithms. (08 Marks)
- b. Explain minimum cut problem in graphs using edge contraction method, considering a suitable example. Also write a Monte-Carlo algorithm for the same. (08 Marks)

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16/17SCS24

**Second Semester M.Tech. Degree Examination, June/July 2018**

## **Internet of Things**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Define internet of things. Justify internet of things is “just a concept”. (08 Marks)  
b. Explain the characteristics of an object. Discuss classification of objects with a diagram. (08 Marks)

**OR**

- 2 a. Explain any four applications of automotives. (08 Marks)  
b. Discuss the basic elements of an M2M application. (08 Marks)

### Module-2

- 3 a. Differentiate between contactless smart card and RIFD tags. (08 Marks)  
b. Discuss the structural aspects of IOT. (08 Marks)

**OR**

- 4 a. Illustrate the working of routing protocol for LLN-RPL. (08 Marks)  
b. List out the main features of COAP. Explain the Request/Response model used by COAP. (08 Marks)

### Module-3

- 5 a. Explain the interaction between NFC interrogator and NFC device communicates. (08 Marks)  
b. Explain IEEE 802.15.4 acknowledgement frame format and data frame format. (08 Marks)

**OR**

- 6 a. List and explain the advantages of IPv6 over IPv4. (08 Marks)  
b. Describe QoS capabilities in IPv6. (08 Marks)

### Module-4

- 7 a. With a neat diagram, explain deployment design of the weather monitoring IOT system. (08 Marks)  
b. Illustrate with figures service specification for home automation IOT system for mode and state service. (08 Marks)

**OR**

- 8 a. Show how the communication occurs between various components of the web socket implementation of the weather monitoring system. (08 Marks)  
b. Write a program in python for smart parking controller native service. (08 Marks)

### Module-5

- 9 a. How do you set up Hadoop cluster? (08 Marks)  
b. Write a short note on Hadoop yarn. (08 Marks)

**OR**

- 10 a. Briefly discuss the functions of the key processes of Hadoop. (08 Marks)  
b. Explain Mapreduce job execution workflow. (08 Marks)

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16/17SCS253

## Second Semester M.Tech. Degree Examination, June/July 2018 Information and Network Security

Time: 3 hrs.

Max. Marks: 80

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Discuss the simplified model of conventional cryptosystem with neat diagram. (04 Marks)  
b. Explain the features of play fair cipher. (04 Marks)  
c. Perform the hill cipher encryption and decryption for the plaintext "PAYMOREMONEY"

by using key  $K = \begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$ . (08 Marks)

OR

- 2 a. Explain the Feistel cipher encryption and decryption with diagram. (08 Marks)  
b. Describe the general depiction of DES encryption algorithm with neat diagram. (08 Marks)

### Module-2

- 3 a. Discuss the applications and requirements for public key cryptography. (08 Marks)  
b. Perform the encryption and decryption using RSA algorithm for the following :  
i)  $p = 3, q = 11, e = 7, M = 5$   
ii)  $p = 5, q = 11, e = 3, M = 9$ . (08 Marks)

OR

- 4 a. What are Abelian groups? Explain the geometric description of addition in Elliptic curves. (08 Marks)  
b. User A and B use the Diffie-Hellman's key exchange technique with a common prime  $q = 71$ , and primitive root of  $\alpha = 7$ . Compute the following :  
i) If user A has private key  $X_A = 5$ , compute  $Y_A$   
ii) If user B has private key  $X_B = 12$ , compute  $Y_B$ . (08 Marks)

### Module-3

- 5 a. Discuss the techniques involved in distribution of public keys. (08 Marks)  
b. Give the format of X.509 certificate with neat diagram. (08 Marks)

OR

- 6 a. Differentiate between Kerberos version 4 and 5. (04 Marks)  
b. Explain decentralized key control. (04 Marks)  
c. With the aid of diagram describe the key distribution scenario. (08 Marks)

### Module-4

- 7 a. Give the general IEEE802 MPDU format. (04 Marks)  
b. Explain the IEEE 802.11 network components and architectural model. (04 Marks)  
c. Describe the IEEE 802.11i phases of operations briefly. (08 Marks)



OR

- 8 a. Explain SSL architecture and SSL record protocol. (08 Marks)  
b. Describe the SSH protocol stack with neat diagrams. (08 Marks)

**Module-5**

- 9 a. Explain any two PGP cryptographic functions. (08 Marks)  
b. Describe the IP security applications and benefits with the help of IP security scenario. (08 Marks)

OR

- 10 a. What are the services of PGP? Explain. (04 Marks)  
b. Explain the various fields of MIME content types. (04 Marks)  
c. Describe the encapsulation security payload (ESP) IP security format with neat diagrams. (08 Marks)

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