

(i) Printed Pages: 2 Roll No. ....

(ii) Questions : 9 Sub. Code : 

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Bachelor of Computer Applications 5<sup>th</sup> Semester  
(2125)

COMPUTER NETWORKS

Paper : BCA-16-501

Time Allowed : Three Hours] [Maximum Marks : 65

Note :— Attempt five questions in all, selecting ONE question each from Section-I to Section-IV and compulsory question.

SECTION—I

1. Explain the layers of the OSI Model in detail. Write the comparison of OSI model and TCP/IP model. 13
2. What do you mean by Transmission Media? Explain guided and unguided transmission media in detail. 13

SECTION—II

3. What are the various error detection and correction codes? Explain checksum, CRC and Hamming code in detail. 13
4. Explain data link protocols for noiseless and noisy channel in detail. 13

### SECTION—III

5. What is congestion control in computer network? Discuss the key principles of congestion control. Discuss the working of Leaky bucket and Token bucket algorithms. 13
6. Write short note on the following : 6,7
- (a) Shortest Path Routing
  - (b) Broadcast and Multicast Routing

### SECTION—IV

7. (a) Explain the architecture and services of e-mail. Write a note on MIME. 7
- (b) Explain Simple Mail Transfer Protocol (SMTP) in detail. 6
8. What is Domain Name System (DNS)? Explain the purpose and functioning of DNS. Also explain DNS Name space and DNS servers in detail. 13

### (Compulsory Question)

9. (a) Explain Bus and Star topology. 3
- (b) What is the role of MODEM? 3
- (c) Explain IPv4 address classes. 3
- (d) Write a short note on HTTP and FTP. 4

(i) Printed Pages : 4

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(ii) Questions : 9

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**Bachelor of Computer Applications 5<sup>th</sup> Semester  
(2125)**

**DISCRETE MATHEMATICAL STRUCTURE**

**Paper : BCA-16-502**

**Time Allowed : Three Hours]**

**[Maximum Marks : 65**

**Note :—** Attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question No. 1 is compulsory.

**(Compulsory)**

1. (i) Let  $U = \{1, 2, 3, 4, \dots, 8, 9\}$ ,  $A = \{x \in U \mid x \text{ is a multiple of } 3\}$ ,  $B = \{x \in U \mid x^2 - 5 \geq 0\}$ . Determine  $A \cap B$  and  $B^c$ .
- (ii) Is the relation  $R_1 = \{(1,1), (1,2), (2,1), (2,2), (3,4), (4,1), (4,4)\}$  reflexive, symmetric, antisymmetric, and transitive?
- (iii) If  $S(k) = k^2 - 1$ ,  $k \geq 1$  is the closed expression for the sequence  $S$ . Show that  $S(k+1) = S(k) + 2k$ ,  $k \geq 1$ . Is this a recurrence relation of the sequences?
- (iv) Define multiple graph, directed graph. Also explain by giving examples.
- (v) Draw the graphs  $K_{2,4}$  and  $K_{2,5}$ .
- (vi) Show that  $x^2 - 2x + 1$  is not  $O(x)$ . 5×2,3

### UNIT-I

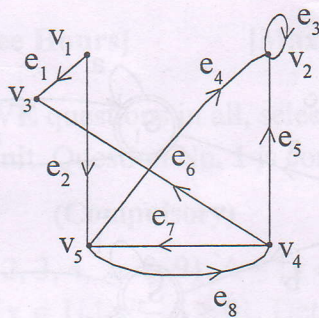
2. (a) Let  $A = \{1, 2, 3\}$ ,  $B = \{a, b, c\}$  and  $C = \{x, y, z\}$ . Let  $R$  and  $S$  be relations from  $A \rightarrow B$  and from  $B \rightarrow C$  as  $R = \{(1, b), (2, a), (2, c)\}$  &  $S = \{(a, y), (b, x), (c, y), (c, z)\}$ . Find the composition relation  $SoR$ . Find matrices  $M_R$ ,  $M_S$  and  $M_{SoR}$  of relations  $R$ ,  $S$  and  $SoR$  and compare  $M_{SoR}$  to  $M_R M_S$ .
- (b) Let  $A = \{1, 2, 3, 4\}$  and  $R = \{(a, b) \mid a > b\}$  be a relation from  $A \rightarrow A$ . Draw the graph of  $R$  and write  $M_R$ . 7,6
3. (a) Show that the function  $f: R \rightarrow R$  defined by  $f(x) = 2x + 3$  is one-one and onto. Does the inverse  $f^{-1}$  exist? If so, find  $f^{-1}$ . Also find  $f \circ f^{-1}$ .
- (b) Let  $f(x) = \frac{x+1}{x+2}$  be a function from  $R \rightarrow R$ . Find the domain and range of  $f(x)$ . 7,6

### UNIT-II

4. (a) Solve the recurrence relation  
 $S(k) - 4S(k-1) + 3S(k-2) = 5^n$ .
- (b) Solve the recurrence relation  $S_k - 2S_{k-1} + S_{k-2} = 1$ ,  
 $S_0 = 2, S_1 = \frac{11}{2}$ . 7,6
5. (a) Write the sequence whose generating function is  $\frac{5+2z}{1-4z^2}$ .
- (b) Solve the recurrence relation  $S(k) - 4S(k-1) + 4S(k-2) = 0, S(0) = 1, S(1) = 6$  using generating function. 7,6

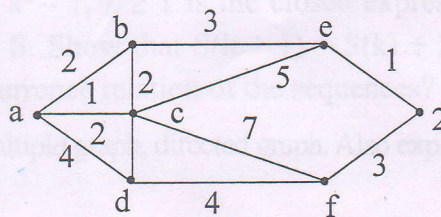
UNIT-III

6. (a) Is it possible to construct a graph with 12 vertices such that 2 of the vertices have degree 3, 3 of degree 2, and the remaining of degree 4?
- (b) Find the
- (i) Adjacency matrix
  - (ii) Incident matrix
- for the graph G given in the figure.



7,6

7. (a) Let  $G(V, E)$  be a graph having  $n$  vertices. Prove that  $G$  or its complement  $\bar{G}$  is non-planar.
- (b) Find the distance from  $a$  to  $z$  using Dijkstra's algorithm.

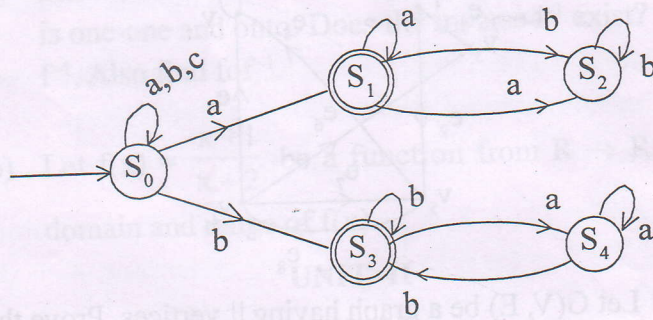


7,6

### UNIT-IV

8. (a) Let  $A = \{a, b\}$  be an alphabet. Show that
- (i)  $aa^* (a \cup b)^* a$
  - (ii)  $(a \cup b)^* (a \cup \phi)$
  - (iii)  $a(a \cup b)^*$  are regular expression over  $A$ .
- (b) Define Finite State Machines (FSM). Give an example. 7,6

9. (a) Write the language of FSM shown below:



- (b) If  $3r^3 + r^2 \log r = O(r^n)$ , find the least positive integer  $n$ .  
 Are  $3r^3$  and  $r^2 \log r$  of the same order? 7,6

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**Bachelor of Computer Applications 5<sup>th</sup> Semester  
(2125)**

**JAVA PROGRAMMING  
Paper : BCA-16-503**

**Time Allowed : Three Hours] [Maximum Marks : 65**

**Note :—** Attempt FIVE questions in all, by selecting ONE question each from Units I, II, III and IV. Unit-V (Question No. 9) is compulsory.

**UNIT-I**

1. (a) Discuss the features of Java programming Language. 7  
(b) Explain different types of looping statements available in Java. 6
2. (a) What are constructors? Explain the concept of constructor overloading with an example. 7  
(b) What is Dynamic Method Dispatch? How is it useful in case of inheritance? 6

**UNIT-II**

3. (a) What are the differences between String and StringBuffer class? Explain any two methods of String class. 7  
(b) What are packages? Explain the steps of creating a user-defined package. 6

4. What are interfaces? Explain how multiple inheritance is implemented in Java using interfaces. 13

### UNIT-III

5. (a) What are exceptions? Explain how are exceptions handled in Java. 7  
(b) What are applets? Explain in detail the life cycle of an applet. 6
6. What is multithreading? Explain the different ways of creating threads in Java with the help of examples. 13

### UNIT-IV

7. What are Layout managers? Explain different AWT layout managers. 13
8. (a) What is event handling? Explain Delegation Event Model of Java with the help of an example. 7  
(b) What is JDBC? Explain the steps of connecting to a database using JDBC. 6

### UNIT-V

#### (Compulsory Question)

9. (a) What is bytecode? 2  
(b) What is use of Scanner class in Java? 2  
(c) What is an abstract class? 2  
(d) What is garbage collection? 2  
(e) What do you mean by Streams? 2  
(f) Explain the uses of final keyword. 3

(i) Printed Pages : 3

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Bachelor of Computer Applications 5<sup>th</sup> Semester  
(2125)

WEB APPLICATION DEVELOPMENT USING PHP

Paper-BCA-16-504

Time Allowed : Three Hours]

[Maximum Marks : 65

Note :— Attempt ONE question from each Unit and the entire compulsory question. All questions carry equal marks.

UNIT—I

1. (a) Explain how server-side scripting interacts with a database.  
(b) Explain the working of a local server environment using WAMP. 6+7
2. (a) Explain different looping structures in PHP with syntax and examples.  
(b) Describe the different data types supported by PHP with examples. 6+7

UNIT—II

3. (a) Write a PHP program to calculate the factorial of a number using a function.  
(b) Explain the difference among include(), require(), include\_once(), and require\_once() with examples. 6+7

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4. (a) Explain five commonly used array functions in PHP with examples.
- (b) What is the use of the `strev()`, `strlen()`, `strpos()`, `str_replace()` functions? How do you convert a string to uppercase? 6+7

### UNIT—III

5. (a) Explain how to create and process a form in PHP.
- (b) Explain the difference between GET and POST with examples. 6+7
6. (a) Explain the purpose of the following functions in PHP:  
`mysqli_connect()`  
`mysqli_close()`  
`mysqli_query()`
- (b) What are Superglobal Arrays? List few superglobal arrays and explain their significance. 6+7

### UNIT—IV

7. (a) Explain the syntax and parameters of the `setcookie()` function with examples.
- (b) What is a session variable in PHP? Explain how a session variable is registered in PHP by giving a suitable example. 6+7
8. (a) How can file permission be checked in PHP?
- (b) Explain different file modes used in the `fopen()` function. 6+7

(Compulsory Question)

9. (a) What is a remote server?  
(b) What is a static website?  
(c) How can you delete a file in PHP?  
(d) What is the function of the echo statement in PHP? What is the difference between call by value and call by reference?  
(e) How can you find the number of elements in an array in PHP?  
(f) Which function is used to join array elements into a string?  
(g) What is the default expiration time of a cookie if not specified?  
(h) State one advantage of client-side scripting.  $6 \times 2 + 1$