

(6 pages)

Reg. No. :

Code No. : 21113

Sub. Code : JACS 11/
JASE 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2016.

First Semester

Computer Science — Allied

DISCRETE MATHEMATICS

(Also common to Software Engineering Major)

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A symmetric relation gives $(a, b) \in R$ and
- (a) $b, a \in R$ (b) $a, a \in R$
- (c) $b, b \in R$ (d) None of these

2. On to function is also called _____.
(a) Bijection (b) Surjection
(c) Injection (d) None of these
3. If $f(a) = 2a$ and $g(a) = 2$ then $f \circ g(a) = ?$
(a) 2 (b) 4
(c) 3 (d) 5
4. $((f)^{-1})^{-1} = ?$
(a) 1 (b) 2
(c) f (d) all of these
5. $p \rightarrow q$ is false then $p = ?$ and $q = ?$
(a) T, F (b) F, T
(c) T, T (d) F, F
6. $p \Rightarrow q$ is equal to $?\Rightarrow \sim p$
(a) $\sim p$ (b) $\sim q$
(c) p (d) q
7. A square matrix B is said to be _____ if $A^2 = A$.
(a) Orthogonal (b) Idem potent
(c) Universe (d) None of these



8. $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then $A^T = ?$

- (a) A (b) $A \cdot A^T$
(c) 0 (d) None of these

9. Binary tree has atmost _____ children.

- (a) 0 (b) 1
(c) 2 (d) 3

10. The degree of self loop counted as _____.

- (a) One (b) Twice
(c) Thrice (d) None of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What is relation? Explain with example.

Or

(b) Explain :

- (i) Reflexive closure
(ii) Symmetric closure.

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12. (a) Write in details about functions with neat diagram.

Or

(b) Let $f:R \rightarrow R$ and $g:R \rightarrow R$ be defined by $f(x) = x + 1$ and $g(x) = 2x^3 + 3$. Find $f \circ g$ and $g \circ f$ is $f \circ g = g \circ f$?

13. (a) Explain about :

- (i) Conjunction
(ii) Disjunction.

Or

(b) Prove that

$$p \rightarrow (q \rightarrow r) \Leftrightarrow p \rightarrow (\neg q \vee r) \Leftrightarrow (p \wedge q) \rightarrow r.$$

14. (a) Explain the types of matrices with example.

Or

(b) Show that $A^T = A$, where A is symmetric matrix.

15. (a) Explain the following :

- (i) Direct
(ii) Undirect
(iii) Weighted graphs.

Or

(b) Show that the sum of the vertices of a graph is even.

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[P.T.O.]



PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) Explain in details about different classification of relations.

Or

- (b) Discuss in details about inverse of relations.

17. (a) Explain the following :

- (i) One-to-one
- (ii) Onto
- (iii) Bijective function.

Or

- (b) Let $f:A \rightarrow B$ and $g:B \rightarrow C$ be two functions, then prove, if both f and g are subjective then $g \circ f$ is subjective.

18. (a) Determine the DNF of
 $p \Rightarrow ((p \Rightarrow q) \wedge (\sim q \vee \sim p))$.

Or

- (b) Find the CNF of the following :

- (i) $p \wedge (p \Rightarrow q)$
- (ii) $(q \vee (p \wedge r)) \wedge \sim((p \vee r) \wedge q)$.

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19. (a) Explain the following :

- (i) Addition
- (ii) Subtraction of matrices.

Or

- (b) Write in details about properties of adjacent of a matrix.

20. (a) Write about any one of Binary tree operation.

Or

- (b) Prove that a simple graph with $n \geq 2$ vertices contains atleast two vertices of same degree.

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