SET

MASTER OF COMPUTER APPLICATION FIRST SEMESTER (SPECIAL REPEAT) MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

MCA-103

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Objective)

Time: 30 mins.

Marks: 20

 $1 \times 20 = 20$

Choose the correct answer from the following:

1. The matrix A is singular if:

a. $|A| \neq 0$

b. |A| > 0

c. |A| < 0

 $\mathbf{d.} \ |A| = 0$

2. If $A = \{1,2,3\}$, $B = \{1,2,3\}$ then A - B is:

a. 0

ь. Ф

c. Both a and b

d. None

3. A - B =

a. $A \cap B^c$

b. Ac OB

c. Both a and b

d. None

4. If $A = \{1,2,3\}$ which of the following is not a subset of A?

a. {1}

b. {{1}}}

с. Ф

d. {3,2}

5. $f(x) = \frac{1}{x}$ then Range of the function is:

a. 00

b. 0

c. Undefined

d. None

6. (A')

a. A

b. A"

c. 00

d. None

7. Two sets are said to be equivalent if they contain:

a. Equal number of elements

b. Same elements

c. Both a and b

d. None

- 8. If ${}^{n}C_{x} = {}^{n}C_{y}$ then:
 - a. x = y

b. x + y = n

c. Both a and b

d. None

- 9. Tautology means:
 - a. All the truth values are True
 - c. Both a and b

- b. All the truth values are False
- d. None
- 10. Which of the following is not an example of set?
 - a. Set of vowels
 - c. Set of flowers

- b. Set of animals
- d. Set of beautiful girls
- 11. The product of two matrix A and B, AB exists:
 - a. If the number of columns in A is equal to the number of rows in B
 - c. If the number of columns in A is not equal to the number of rows in B
- b. If the number of columns in B is equal to the number of rows in A
- d. If the number of columns in B is not equal to the number of rows in A

- 12. $^{27}C_0 =$
 - a. 1
 - c. 27

- b. 0
- d. None

- $A = \begin{bmatrix} 2 & 0 \\ 2 & 2 \end{bmatrix}$ is a:
 - a. Scalar matrix c. Unit matrix

- b. Diagonal matrix
- d. None
- If $A = \begin{bmatrix} 2 & -3 \\ 5 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & -3 \\ 9 & 1 \end{bmatrix}$, then A + B = ?
 - $A + B = \begin{bmatrix} -9 & 0 \\ 14 & 5 \end{bmatrix}$
 - c. $A+B = \begin{bmatrix} 9 & 0 \\ 1 & 5 \end{bmatrix}$

- b. $A + B = \begin{bmatrix} 9 & 0 \\ 14 & 5 \end{bmatrix}$
- d. $A + B = \begin{bmatrix} 9 & 0 \\ 14 & -5 \end{bmatrix}$
- 15. Two statements are logically equivalent if their truth values are:
 - a. True c. Same

- b. False
- d. All of the above
- 16. If $f(x) = \frac{\sqrt{x+1}}{\sqrt{x+2}}$ the domain is:
 - a. 0
 - c. Undefined

- b. 1
- d. None
- 17. A matrix A is invertible if:
 - a. |A| = 0

b. $|A| \neq 0$

c. A is singular

d. None

2

18. If $f(x) = \frac{1}{x-2}$ then f(x) is undefined at:

a.
$$x = 2$$

b.
$$x = 0$$

c.
$$x = 0$$

d.
$$x = 1$$

19. If $A = \{1,2,3\}$ then which of the following is a reflexive relation from A to A?

a.
$$R = \{(1,1), (1,2), (2,2)\}$$

b.
$$R = \{(1,1), (1,2), (3,2)\}$$

c.
$$(R = \{(1,1), (1,2), (2,2), (1,3)\}$$

20. A relation is said to be Equivalence if it is:

[Descriptive]

Time: 2 hr. 30 mins.

Marks: 50

[Answer question no.1 & any four (4) from the rest]

1. a) State the pigeonwhole principle with example.

b) If
$$A = \begin{bmatrix} 2 & -1 & 7 \\ 3 & 4 & 3 \\ -4 & 4 & 2 \end{bmatrix}$$
 find A^{-1}

2. a) If,

p: Puja is brilliant

5+5=10

q:Puja is regular

Write the meanings of $p \rightarrow q$, $(p \leftrightarrow q)$, $p \rightarrow \sim q$

- b) Find the number of possible ways in which the letters of the word COTTON can be arranged so that the two 'T' s do not come together.
- 3. a) Write power sets of $A = \{0,1,\{0\}\}\$

5+5=10

- b) Define equivalence relation. Show that the relation
- $R:\{(x,y)|x-y \text{ is divisible by 2}\}$ is an equivalence relation.

- 4. a) Show that $(AB)^{-1} = B^{-1}A^{-1}$ if $A = \begin{pmatrix} 3 & 6 \\ -2 & 5 \end{pmatrix}$ 5+5=10
 - b) Test whether $(p \rightarrow q) \lor (r \rightarrow \sim r)$ is a tautology or contradiction.
- 5. a) If ${}^{18}C_r = {}^{18}C_{r+2}$ find the value of ${}^{\prime}C_5$.
 - b) Find range and domain of the function $f(x) = \frac{x-3}{x+5}$
- 6. a. If $f(x) = x^2 + 2x$, $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$, find f(A) 5+5=10
- b. Show that $\sim p \lor \sim q$ and $\sim (p \land q)$ are logically equivalent.
- 7. a) Prove that, 5+5=10
 - (i) $(A \cap B)^c = A^c \cup B^c$
 - (ii) $(A \cup B)^c = A^c \cap B^c$
 - b) If $A = \begin{bmatrix} -1 & 2 \\ 2 & 3 \end{bmatrix}$ find AdjA hence find A^{-1}
- 8. a) What do you mean by Adjoint and inverse of a matrix? 5+5=10
 - b) If $A = \begin{bmatrix} -1 & 2 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$, Show that: $(A+B)^2 \neq A^2 + 2AB + B^2$
