

GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject: Mathematics

Paper name: Algebra

Paper no: 2

Semester: II

A Multiple choice question

1. Diagonal elements of a skew-symmetric matrices is

- a) 0
- b) 1
- c) 4
- d) 2

2. Let A be any square matrix. Then $\frac{1}{2} (A + A^T)$

- a) Hermitian
- b) skew-hermitian
- c) symmetric
- d) skew-symmetric

3. If $A = \begin{bmatrix} 1 & 0 & 1 \\ 3 & 4 & 5 \\ 2 & 3 & 4 \end{bmatrix}$. Then A^{-1}

a) $\begin{bmatrix} 1 & 3 & -4 \\ -2 & 2 & -2 \\ 1 & -3 & 4 \end{bmatrix}$

b) $\frac{1}{2} \begin{bmatrix} 1 & 3 & -4 \\ -2 & 2 & -2 \\ 1 & -3 & 4 \end{bmatrix}$

c) $\frac{1}{2} \begin{bmatrix} 1 & 0 & 1 \\ 3 & 9 & 5 \\ 2 & 2 & 4 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 3 & 4 \\ 2 & -2 & 2 \\ 2 & 3 & 4 \end{bmatrix}$

4. The rank of $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 2 & 2 \end{bmatrix}$ is

- a) 1
- b) 4
- c) 5
- d) 3

5. If A and B are Hermitian, then AB-BA is skew-hermitian then AB+BA is

- a) Hermitian
- b) skew-hermitian
- c) symmetric

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d) skew-symmetric

6.The number of binary compositions of finite set A having n elements is

a) n^{n^2}

b) 2^{n^2}

c) n^n

d) $n!$

7.The identity element of integer I with respect to addition is

a) 1

b) 0

c) e

d) -1

8.If the inverse of a is a^{-1} . Then the inverse of a^{-1} is

a) a^{-1}

b) $2a$

c) a

d) a^2

9.A necessary and sufficient condition for non-empty subset H of a group G to be a sub-group is

a) $a \in H, b \in H \Rightarrow ab \notin H$

b) $a \in H, b \in H \Rightarrow a^{-1}b \in H$

c) $a \in H, b \in H \Rightarrow ab^{-1} \in H$

d) $a \in H, b \in H \Rightarrow ab \in H$

10.The number of generators of a cyclic group of order 16 is

a) 16

b) 1

c) 4

d) 8

11.If H is subgroup of a finite group G the index of H is

a) $G=o(G)/o(H)$

b) $G \neq o(G)/o(H)$

c) $G = o(H)/o(G)$

d) $o(G)=o(H)/G$

12.If G is a finite group of order n and $a \in G$ then

a) $a^e = n$

b) $a^n = e$

c) $a^{-1} = e$

d) $an = e$

13.When 99^{20} is divided by 25, the remainder is

a) 20

b) 5

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- c) 15
- d) 1

14. A homomorphism of a group into itself is called

- a) an isomorphism
- b) kernel of a homomorphism
- c) an endomorphism
- d) an automorphism

15. Let $f: G \rightarrow G'$ be a group homomorphism. Then $\ker f = \{e\}$ if and only if f is

- a) an automorphism
- b) an isomorphism
- c) an endomorphism
- d) an isomorphic image

16. If $f(x)$ is divided by $ax+b$, then the remainder is

- a) $f(-b/a)$
- b) $f(b/a)$
- c) $f(a/b)$
- d) $f(-a/b)$

17. When $f(x) = 3x^2 + 5x - 8$ is divided by $(x-2)$, the remainder is

- a) 2
- b) 12
- c) 8
- d) 14

18. If a polynomial $f(x)$ is divided by $(x-a)$ and if the remainder $R = f(a) = 0$, then $(x-a)$ is a factor of

- a) $f(a)$
- b) $f(x)$
- c) $(x-a)$
- d) a

19. The polynomial $x^4 + x^2 + 1$ is a factor of

- a) $x^6 - 1$
- b) $x^{12} - 2$
- c) $x^{12} - 1$
- d) $x^{12} - 4$

20. The expression $x^5 - 61x + p$ is divisible by $x+1$. The value of p is

- a) 62
- b) -60
- c) 60
- d) 0

21. The value of $\left(\frac{1 + \cos\theta + i\sin\theta}{1 + \cos\theta - i\sin\theta} \right)^5$ is

- a) $\cos 5\theta + i\sin 5\theta$
- b) $\cos \theta + i\sin \theta$

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- c) $\cos\theta - i\sin\theta$
d) $\cos5\theta - i\sin5\theta$

22. The De-Moivre's form of -1 is

- a) $\cos\pi - i\sin\pi$
b) $\cos\pi + i\sin\pi$
c) $\cos2\pi - i\sin2\pi$
d) $\cos2\pi + i\sin2\pi$

23. If α, β, γ are the roots of the equation $3x^3 - 4x^2 + 7 = 0$; then $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}$ is

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

24. The equation whose roots are reciprocals of the roots $6x^3 + 5x^2 - 1 = 0$ is

- a) $6 + 5y - y^3 = 0$
b) $6y + 5y^2 - y^3 = 0$
c) $6y^2 + 5y^3 - y^4 = 0$
d) $6y + 5 - y^3 = 0$

25. If the sum of two roots of the equation $x^3 - 5x^2 - 16x + p = 0$ is zero, then the value of p is

- a) 0
b) 16
c) 80
d) 20

B. Fill up the blanks

1. An $m \times n$ matrix is a square matrix if _____.
2. Let A be a square matrix and if $|A| = 0$, then A is _____.
3. Row rank of a matrix A is equal to _____ rank of A.
4. The number of commutative binary operation in A is _____.
5. Every subgroup of a cyclic group is _____.
6. Suppose G is a group and H is any subgroup of G. Let a be any element of G then Ha is called _____ of H in G generated by a.
7. The order of each subgroup of a finite group is a _____ of the order of the group.
8. Every group of _____ order is cyclic.
9. If f is a homomorphism of G into G' , then the set K of all those elements of G which are mapped by f onto the identity elements of G' is called _____ of the homomorphism of f.
10. If $f(x)$ is divided by $x+a$, the remainder is _____.
11. The remainder obtained when $4x^5 + 3x^3 + 6x^2 + 5$ is divided by $2x+1$ is _____.
12. If a polynomial $f(x)$ is divided by $(x-a)$, then the remainder is _____.
13. One root of the equation $2x^3 - 21x^2 + 42x - 16 = 0$ whose roots are known to be in GP is _____.
14. The roots of cubic equation are $2+i$, $2-i$ and 3. The equation is _____.
15. The equation of third degree with real coefficients whose two roots are 2 and i is _____.

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KEY ANSWER

A Multiple choice question

1.a) 2.c) 3.b) 4.d) 5.a) 6.a) 7.b) 8.c) 9.b) 10.d) 11.a) 12.b) 13.d) 14.c) 15.b) 16.a) 17.d) 18.b) 19.c) 20.c) 21.a) 22.b) 23.c) 24.a) 25.c)

B Fill up the blanks

1.m=n

2.singular matrix

3.column

4. $(n^2+n)/2$

5.cyclic

6.the right coset

7.divisor

8.prime

9.kernel

10.f(-a)

11.6

12.f(a)

13.2

14. $x^3-7x^2+17x-15=0$

15. $x^3-2x^2+x-2=0$