N 18MAB 302 T DISCRETE MATHEMATICS

CYCLE TEST-3

Unit 4

1. Set of all 2x2 non - singular matrices with real entries under matrix multiplication
   (a) Doesn't form a group (b) forms an abelian group
   (c) Forms a finite group (d) forms an infinite non-abelian group

   Ans: (d)

2. Subgroup of the group of real numbers under addition $(R,+)$ is

   (a) (Z,+)
   (b) $(Z^{+},+)$
   (c) $(Q,\bullet)$
   (d) $(R,-)$

Ans: (a)

2. In the cyclic group G={1,-1,i,-i} under multiplication it's generators are
   a) {1,i}
   b) {1,-i}
   c) {-1,i}
   d) {i,-i}

Ans: (d)

4.In a permutation group S_3, if $p=\begin{pmatrix} a & b & c \\ b & c & a \end{pmatrix}$, then inverse of p is

(a) $\begin{pmatrix} a & b & c \\ c & a & b \end{pmatrix}$

(b) $\begin{pmatrix} a & b & c \\ a & c & b \end{pmatrix}$

(c) $\begin{pmatrix} a & b & c \\ b & c & a \end{pmatrix}$

(d) $\begin{pmatrix} a & b & c \\ b & a & c \end{pmatrix}$

Ans: (a)

5.In a permutation group if $P_1 = \begin{pmatrix} a & b \\ a & b \end{pmatrix}$ $P_2 = \begin{pmatrix} a & b \\ b & a \end{pmatrix}$ then $P_2 * P_1$ =

a) P_1

b) P_2

c) P_1^{-1}

d) P_2^{-1}

Ans: b

6.If {G,*} is a finite cyclic group of order n with "a " as generator element, then ……….is also a generator iff the GCD of (m,n)=1 where m < n.

a) a^m
b) a^n
c) a^{m+n}
d) b^{-1}

Ans: a

7. The inverse of the element "a" in group $(G,*)$ with binary operation a*b=a+b+2

(a) – a (b) a^{-1} (c) – 2 (d) – (a+4)

Ans: (d)

8.The order of the element –i in the group {1, -1,i,-i} under multiplication is

a) 1
b) 2
c) 3
d) 4

Ans: (d)

9.A cyclic group is ………………..

a) Subgroup

b) Abelian group

c) permutation group

d) Dihedral group

Ans: b

10. In a group, (G, *) for any a, b ε G, $(a*b)^{-1}$ = …………………..

a) $a^{-1} * b^{-1}$
b) $b^{-1} * a^{-1}$
c) a*b
d) b *a

ans b

11. If *is the binary operation on the set R of real numbers defined by a *b = a+b+2ab, then the identity element is

a) 0

b) 1

c) 1+2a

d) 2a

Ans:a

12. The kernel of a homomorphism f from a group (G,*) to another group (G′, Δ) is a …………… of (G, *)

a) Empty subset of G
b) Subgroup of G
c) Abelian subgroup of G
d) Cyclic Subgroup of G

Ans: b

13.If a and b are any two elements of a group G such that $(a*b)^2 = a^2 * b^2$, then G is a …….

a) Cyclic group

b) Abelian Group

c) Permutation Group

d) Dihedral Group

Ans: b

14. The identity element of a group is the only element whose order is …

a) 1

b) 2

c) n

d) m + n

Ans: a

15.The multiplicative group $\{1, \omega, \omega^2\}$ where ω is a cube root of unity is a …….

a)Ring

b) Non-abelian group

c) Cyclic group

d) Monoid

Ans: c

16.A commutative ring with unity and without zero divisors is called an ………………..

a) Integral domain

b) zero divisor

c) Ring homomorphism

d) Field

Ans:a

17. Every finite integral domain is a …………….

a) cyclic group

b) Non-commutative Ring

c)Non abelian group

d) Field

Ans: d

18.The inverse operation of encoding is…………

a)Group code

b) Hamming code

c)) Decoding

d) Input message

Ans:c

19.The number of 1's in the binary string is called……………..

a) Distance

b) Group code

c)weight

d) Parity digit

Ans:c

20. A code can correct a set of atmost 'K' errors iff the minimum distance between any two code words is atleast ………..

a) 2k-1

b) k+1

c) k

d) 2k + 1

Ans:d

21. The number of errors can be corrected between the encoded words 000 and 111 is

a) Three errors

b) Two errors

c) Zero or one error

d) Four errors

Ans:c

22. If x = 10110 , y = 11110, then H(x,y) =

a)2

b) 1

c) 3

d) 4

Ans:b

23.The device which transforms the encoded message into their original form is…..

a) encoder

b) Decoder

c) Hamming Code

d) coding theory

Ans: b

24.If $(B^n, \oplus)$ is ………………… where $\oplus$ is addition modulo 2

a) Field

b) Cyclic group

c) Abelian group

d) Ring homomorphism.

Ans: c

25.Find the code words for e(111), e(110) generated by the parity check matrix:

$$H = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ when the encoding function is e: $B^3 \rightarrow B^6$,

a) 000000,001010
b) 000110,100110
c) 110000,110100
d) 111001,110010
Ans :d

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