KVS BHOPAL REGION CBT TEST SEPT 2023
SUBJECT-MATHEMATICS
CLASS-11

TOPICS:
Complex Numbers and Quadratic Equations, Linear Inequalities, Permutations and Combinations

Q1. The value of $1 + i^2 + i^4 + i^6 + \ldots + i^{2n}$ is

(A) positive (B) negative (C) 0 (D) cannot be evaluated

Feedback

As $i^{2n}=-1$ when n is odd that is n=1,3,5... and $i^{2n}=1$ when n is even that is n=2,4,6... Therefore if n is odd the last term will be -1 and hence the sum is: $1+i^2+i^4+i^6+....+i^{2n}=1+(-1)+1(-1)+1.....(-1)=0$
and if n is even the last term will be 1 and hence the sum is:
$1+i^2+i^4+i^6+....+i^{2n}=1+(-1)+1(-1)+1.....1=1$
So the answer is 0 or 1 depending on whether n is odd or even.
Unless n is specified exact answer cannot be determined.

Q2. If $|x-1| > 5$, then

(A) $x \in (-4, 6)$ (B) $x \in [-4, 6]$ (C) $x \in (-\infty, -4) \cup (6, \infty)$ (D) $x \in [-\infty, -4) \cup [6, \infty)$

Feedback
The correct option is C, $x\epsilon(-\infty,-4)\cup(6,\infty)$
Given, $|x-1|>5 \Rightarrow (x-1)<-5$ or $(x-1)>5$ [$\because |x|>a \Rightarrow x<a$ or $x>a$]$x<-4$ or $x>6 \Rightarrow x\epsilon(-\infty,-4)\cup(6,\infty)$

Q3. There are 10 true-false questions in an examination. These questions can be answered in:

(A) 20 ways (B)100 ways (C)512 ways (D)1024 ways

Feedback

Since the question is true or false type, so each question has two choices either it can be true or false and answering each question is independent of other, so total number of ways of answering these question will be $=2\times2\times.....\times2(10\text{times})=2^{10}$

Q4. A student is to answer 10 out of 13 questions in an examination such that he must choose at least 4 from the first five questions. The number of choices available to him is

(A) 40 (B) 196 (C) 280 (D) 346

Feedback Total number of ways is $={}^5C_5.{}^8C_5+{}^5C_4..{}^8C_6=196$

Q5. The number of ways of painting the faces of a cube with six different colors is

(A) 1 (B) 6 (C) 6! (D) 6X6

Q6. The least value of n for which $\{(1 + i)/(1 - i)\}^n$ is real, is

(A) 1 (B) 2 (C) 3 (D) 4

Feedback

First, we rationalize the given expression by multiplying and dividing the given expression by the conjugate of denominator,
$[(1+i)/(1-i) \cdot (1+i)/(1+i)]^n = x$ (say)
This means $(2i/2)^n = x$
This gives $i^n = x$
As, $i^{-2} = -1$. $i^{-1} = -i$, $i^0 = 1$. $i^1 = i.$, $i^2 = -1$. $i^3 = -i$. $i^4 = 1$. $i^5 = i$. $i^6 = -1$. $i^n = i.$.
Therefore the minimum value of n is 2 for which $i^n = x$ is real.

Q7. The modulus of 5 + 4i is

(A)41 (B) -41 (C) √41 (D) -√41

Feedback

$|5+4i|=\sqrt{(5)^2+(4)^2}=\sqrt{25+16}=\sqrt{41}$

Q8. Each of these questions contains two statements Assertion (A) and Reason (R). Each of the questions has four alternative choices, any one of the which is the correct answer. You have to select the correct choice as given with question.

(a) A is true, R is true; R is a correct explanation of A.
(b) A is true, R is true; R is not a correct explanation of A.
(c) A is true; R is false
(d) A is false; R is true.

Assertion (A) Multiplicative inverse of 2-3i is 2+3i.

Reason (R) If $z = 3+4i$, then $\bar{z}=3-4i$.

Feedback

Multiplicative inverse of 2-3i is not 2+3i. It is 1/(2-3i)

So, A is false; R is true.

Q9.Assertion (A) : The number of selections of 20 distinct things taken 8 at a time is same as that taken 12 at a time

Reason (R): C(n, r) = C(n, s), if n = r+s

A. Both A and R are individually true, and R is the correct explanation of A

B. Both A and R are individually true but R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

Feedback

As $^{20}C_8 = {}^{20}C_{20-8} = {}^{20}C_{12}$

Therefore, the number of selections of 20 distinct things taken 8 at a time is same as that taken 12 at a time. So, Both A and R are individually true, and R is the correct explanation of A.

Q10. Each of these questions contains two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion

(c) Assertion is correct, reason is incorrect

(d) Assertion is incorrect, reason is correct.

Assertion(A) : If $3x + 8 > 2$, then $x \in \{-1, 0, 1, 2, \ldots\}$, where x is an integer.

Reason(R) : The solution set of the inequality $4x + 3 < 5x + 7 \ \forall x \in R$ is $[4,\infty)$.

Feedback

The solution set of the inequality $4x + 3 < 5x + 7 \ \forall x \in R$ is $(-4,\infty)$.

So, Assertion is correct, reason is incorrect.

Answer Key

Q.1 D	Q2. C	Q3. D	Q4. B	Q5. A
Q6. B	Q7. C	Q8. D	Q9. A	Q10 C