MATHS

BOOKS - S CHAND MATHS (ENGLISH)

PRINCIPLE OF MATHEMATICAL INDUCTION

Illustrative Examples For Multiple Choice Questions

1. If n is an odd natural number, then $n\left(n^2-1\right)$ is divisible by:

(i) 24

(ii) 48

(iii) 120

(iv) 64

A. 24

B. 48

C. 120

D. 64

Answer: a

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2. For all $n \in N$, $2^{n+1} + 3^{2n-1}$ is divisible by:

(i) 5

(ii) 7

(iii) 14

(iv) 135

A. 5

B. 7

C. 14

D. 135

Answer: b

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Multiple Choice Questions

1. Let $P(n): 2^n < n!$, then the smallest positive integer for which P(n) is true is:

(i) 1

(ii) 2

(iii) 3

(iv) 4

A. 1

B. 2

C. 3

D. 4

Answer: D

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2. Consider the statement $P(n): n^2 - n + 41$ is prime. Them which of the following is true?

A. Both P(3) and P(5) are true

B. P(3) is true but P(5) is false

C. Both P(3) and P(5) are false.

D. P(3) is false but P(5) is true.

Answer: A

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3. Let

$P(n) = 1 + 3 + 5 + ... + (2n - 1) = 3 + n^2$

, then which of the following is true?

(i) P (3) is correct

(ii) P (2) is correct

(iii) $P(m) \Rightarrow p(m + 1)$

(iv) $P(m) \not\Rightarrow P(m + 1)$

A. P (3) is correct

B. P (2) is correct

C. $P(m) \Rightarrow p(m + 1)$

D. $P(m) \not\Rightarrow P(m+1)$

Answer: C

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4. Let $P(n): n^2 < 2^n, n > 1,$ then the smallest positive integer for which P(n) is true?

(i) 2

(ii) 3

(iii) 4

(iv) 5

A. 2

B. 3

C. 4

D. 5

Answer: D

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5. Consider the statement $P(n): 10n + 3$ is prime, then which of the following is not true?

A. (a)$P(1)$

B. (b) $P(2)$

C. (c) $P(3)$

D. (d) $P(4)$

Answer: C

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6. Let P(n) be the statement $n(n+1)(n+2)$ is an integral multiple of 12, then which of the following is not true?

A. (a) P(3)

B. (b) P(4)

C. (c) P(5)

D. (d) P(6)

Answer: C

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7. Let $P(n):(2n+1)<2^n$, then the smallest positive integer for which P(n) is true?

A. (a)2

B. (b)3

C. (c)4

D. (d)5

Answer: B

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8. If $10^n + 3.4^{n+2} + k$ is divisible by $9, \forall n \in N$ then the least positive integral value of k is

A. (a) 1

B. (b) 3

C. (c) 5

D. (d) 7

Answer: C

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9. For all $n \in N$, $3.5^{2n+1} + 2^{3n+1}$ is divisible by:

(i) 17

(ii) 19

(iii) 23

(iv) 25

A. 17

B. 19

C. 23

D. 25

Answer: A

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10. If $x^n - 1$ is divisible by x-k, then the least positive integral value of k is:

(i) 1

(ii) 2

(iii) 3

(iv) 4

A. 1

B. 2

C. 3

D. 4

Answer: A

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11. A student was asked to prove a statement P(n) by induction. He proved that $P(k+1)$ is true whenever P(k) is true for all $k \geq 5 \in N$ and also that P(5) is true. On the basis of this

he conclude that P(n) is true

(i) $\forall n \in W$

(ii) $\forall n > 5$

(iii) $\forall n \geq 5$

(iv) $\forall n < 5$

A. $\forall n \in W$

B. $\forall n > 5$

C. $\forall n \geq 5$

D. $\forall n < 5$

Answer: C

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