**ALVA’S PRE –UNIVERSITY COLLEGE , MOODBIDRI**

**JEE/NEET CRASH COURSE 2019-20**

**MATHEMATICS**

TOPIC : MATHEMATICAL INDUCTION,SEQUECES AND SERIES,

MATHEMATICAL REASONING

1)Let P(n): 2n < (1x2x3x4x….xn). Then the smallest positive integer for

which P(n) is true is

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

2) If P(n) : “2.42n+1+33n+1 is divisible by λ for all n N is true,then the value of λ is

a)3 b) 11 c)209 d)5

3) If P(n): “ 49n+16n+k is divisible by 64for n N ” is true , then

The least negative integral value of k is

1. -1 b) -2 c) -3 d)-4

4) The smallest positive integer n for which n! < holds is,

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

5) The greatest positive integer which divides (n+1)(n+2)….(n+r) for all nN is,

a) r b) r! c)(n+r) d) (r+1)!

6) The inequality n!>2n-1 is true

a) for all nN b) for all n>1

c) for all n>2 d) for no nN

7)The sum of the cubes of three successive natural numbers is divisible by,

a) 6 b) 9 c) 27 d) 8

8)If 10n+3. 4n+2 +k is divisible by 9 for all nN, then the least positive integer

value of k is

1. 5 b) 3 c) 7 d) 1

9) The number (492 - 4 )(493 - 49 ) is divisible by

a) 5! b) 6! c) 9! d) 7!

10)If xn – 1 is divisible by x-k ,then the least positive integral value of k is

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

11) If P(n) :2n < n! , nN , then P(n) is true for all n

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

12) If (a-1) is the G.M between (a-2) and (a+1) then a =

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

13) 

a)  b)  c)  d) 

14) The 50th term of the series 2+3+6+11+18+……… is

a)  b)  c) 502 d) 

15) The 12th  element from the end of AP 3,8,13,……,253 is

a) 190 b)194 c) 198 d) 200

16) The sum of all two digit numbers which when divided by 4,yield unity

as remainder is

a) 1012 b) 1201 c) 1212 d) 1210

17) sum of all integers between 100 and 200 which are not divisible by 2 is

a) 7000 b) 7550 c) 7500 d) 7250

18) The sum of the series 152 + 162 + ………… + 302 is

a) 7440 b) 8440 c) 6220 d) 4220

19) The nth term of 3 + 13 + 29 + 51 + 79 + …………. is

a) 3n2 + n + 1 b) 3n2 + n - 1 c) 4n2 – 1 d) 3n2 – n + 1

20) The sum  is

a) 3 b) 6 c) 9 d) 12

21) If second ,third and sixth terms of an AP are consecutive elements of a GP .

The common ratio of the GP is

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

22) Let P(n) denote the statement that n2+n is odd. It is seen that P(n) => P(n+1) . P(n) is true for all

a) n>1 b) n c) n>2 d) none

23) The sum to n terms of a series is 2n+1 + n -2 , then the nth term is

a) 2n + 1 b) 3n – 1 c) 2n + 1 d) 3n + 1

24) If m, n are any two odd positive integers with m > n then the largest

positive integers which divides all the numbers of the type m2 – n2  is

a) 4 b) 6 c) 8 d) 9

25) where n is even . When n is

Odd , the sum is

a)  b)  c)  d) 

26)The 10th  common term between the series 3+7+11+…… and 1+6+11+…. is

a) 191 b) 193 c) 211 d) 181

27) If a clock strikes appropriate number of times at each hour . Then the number

of times it strikes in one full day is

a)78 b)156 c) 144 d) 72

28) 

a)  b)  c)  d) 

29) The minimum value of 4x + 41-x , x €R is

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

30) “The diagonals of a rhombus are perpendicular” The contra positive of this

statement is

a) If the figure is not a rhombus ,then its diagonals are not perpendicular

b ) If the diagonals are perpendicular ,then the figure is a rhombus

c) If the diagonals are not perpendicular ,then the figure is a rhombus

d) If the diagonals are not perpendicular ,then the figure is not a rhombus

31) The inverse of “if x then x ЄA or xє B” is

a)if xthen x & x b) if xthen x or x

c) if x or x then x d)none

32) The contra-positive of the inverse of p→~q

a) ~q→~p b) ~p→~q c) ~q→p d) p→q

33) Negate the following proposition :” If it rains heavily , the college is closed

But the students do not go home”

1. It rains heavily and either the college is not closed or the students

go home

b)It does not rain heavily and the college is closed or the students go home

c) It does not rain heavily , the college is neither closed nor the students

go home

d) None of these

34) If p ,q ,r have truth values T,F,T respectively , which of the following is true ?

a)(p=>q)Λr b) (p=>q)Λ~r c)(pΛq)Λ(pνr) d) q=>(pΛr)

35) The truth value of the contra positive of the statement “ If xA, xB then

xAB” is

a) T b) F c) no conclusion d) None

36) Let p:2+3=5 ; q=  is irrational. The symbolic form of the statement

“ It is not true that 2+3=5 iff  is irrational” ,is

a) ~pq b) ~p~q c) ~(p~q ) d) ~( pq)

37) Which of the following is not logically equivalent to the proposition:

”A real number is either rational or irrational”

a) If a number is neither rational nor irrational then it is not real

b) If a number is not rational or not an irrational then it is not real

c) If a number is not real , then it is neither rational nor irrational

d) If a number is real , then it is rational or irrational

38) Negation of “2+3=5 and 8<10” is

a) 2 + 3 ≠ 5 and 8 < 10 b) 2 + 3 = 5 and 8 </ 10

c) 2 + 3 ≠ 5 or 8 </ 10 d) None of these

39) The contrapositive of  is

a)  b)  c)  d) 

40) If (p Λ ~r)  (~ p ν q ) is false , then truth values of p , q , r are

respectively

a) F ,F & T b) T, F & F c) T, F & T d) F, T & T

41) The negation of p ν (q Λ ~r ) is

a) pΛ(~qν r) b) ~pΛ(~qΛr) c) ~pΛ(~qν r) d) None

42) Contrapositive of the inverse of the proposition “if I am Ok, then

everybody is Ok” is

1. If everybody is Ok ,then I am Ok
2. If everybody is not Ok , I am not Ok
3. If I am not Ok, then everybody is not Ok
4. If I am Ok, then everybody is Ok

43) The negation of the proposition “ If then ” is

a)  b) 

c) If  d) 

44) The third term of a GP is 4 , the product of the first five terms is

a) 64 b)1024 c)256 d) 512

45) The sum to n terms of an AP is n(n+3), the common difference is

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

46) The nth term of the series 2∙12∙33+3∙22∙43+…. Is

a) (n2+3n+2)(n2+2n)2 b) (n2+3n+2)(n2+2n+1)2

c) (n2+3n)(n2+2n+1)2 d) None of these

47) Sum to n terms of the series is  The 20th term is

a)  b)  c)  d)None of these

48) If the sum of n terms of the series 23+43+63+…∞ is 3528 then n=

a) 6 b) 7 c)8 d)9

49) =

a)  b)  c)  d) 

50) 12+1+22+2+32+3+…n2+n=

a)  b)  c)  d) 

51) If  then

a) n=3 b) n=-1 c) n2=3 d) n=1

52) If the sum of first n terms of a series is 5n2+2n then its second term is

a) 7 b) 27 c) 24 c) 17

53) The fourth ,seventh and tenth terms of a G.P are p, q and r respectively

then Which one of the following is true ?

a)P2=q2+r2 b) p2= qr c) q2=pr d) r2=p2+q2

54) 7th term of an A.P is 40 . The sum of the first 13 terms is

a) 520 b) 53 c) 2080 d) 1040

55) If p(n) = 2+4+6+…….+2n ,n€N ,then P(k) = K(K+1)+2 =>P(K+1) =

(K+1)(K+2)+2 For all n€N .So we can conclude that

P(n)=n(n+1) +2 for

1. All n€ N b) n>1 c) n>2 d) nothing can be said

56)The sixth term of a H.P is 1/61 and 10th term is 1/105 . Then the first term of

that H.P is

a) 1/17 b) 1/6 c) 1/39 d) 1/28

57) The sum to infinity of the progression 9 – 3 + 1 –  + ……. is

a) 27/4 b) 15/2 c) 9 d) 9/4

58) Sn = to n terms , then 6Sn=

a)  b)  c)  d) 

59) The sum to n terms of the series 12+(12 + 22)+(12+22+32)+……

a)  b)  c)  d)  60) The 99th term of the series 2 + 7 + 14 + 23 + 34 + ……………. is

a) 9999 b) 9998 c) 10000 d) None

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Solutions:

1. Ans: d P(1),P(2),P(3) all are false. P(4) is true
2. Ans:b for n =1, P(n)= 209 , For n =2 , P(n) = 4235

HCF of 209 and 4235 is 11

So, P(n) is divisible by 11. Hence λ = 11

1. Ans:a for n=1 ,p(1) :65 +k is divisible by 64

Thus,k should be -1

4) Ans: c

5) Ans: b Product of r consecutive integers is divisible by r!

6) Ans: c Put n=1,2,3,…. Verify

7) Ans: b

Let the numbers be n, n+1, n+2. Sum of the cubes of successive natural

Numbers is . Put n=1,2,…. And verify

8) Ans:a put n=1 ,202+k is divisible by 9 if k = 5

9) Ans : a product of 5 consecutive numbers

10) Ans : a xn -1n is a multiple of x-1

11)Ans: d

12Ans: b (a-1)2=(a-2)(a+1) => a=3

13)Ans:d put n=1

14) Ans:b successive differences are in AP .

using method of differences solve it .

15) Ans: c a=253 , d = -5 ,t12=253+12x-5=198

16) Ans:d

17) Ans:c sum =101+103+105+….+199= 50/2[101+199]

18) Ans:b 

19) Ans:b put n=2

20) Ans:a 

21) Ans:c a+d, a+2d, a+5d are in GP => d= -2a

22) Ans: d

23) Ans:c Tn=Sn-Sn-1

24) Ans:c m2 - n2 = (2n+3)2-(2n+1)2

25) Ans:b put n=3

26) Ans:a first common term = 11=a , d=LCM(4,5) =20 , T10 =11+9x20=191

27) Ans:b 2(1+2+3+….12) = 2

28) Ans:d put n=2

29) Ans:b AM ≥ GM

30) Ans:d

31) Ans:a

32) Ans:c

33) Ans:a

34) Ans:d

35) Ans:a

36) Ans:d

37) Ans:b

38) Ans:c

39) Ans:c

40) Ans:b

41) Ans:c

42) Ans: a

43) Ans: b

p : x AB , q : xA , r : xB

Then given statement is p

Then ~ [ p] = p 

44) Ans:b ar2=4 , a.ar.ar2.ar3.ar4 =45

46) Ans: a

nth term = (n+1) = (2

47) Ans: a

, and  and

48) Ans: a

;

2 , n(n+1)=42 ,

=> n=6 or n= -7 , but n-7



49) Ans: b

Put n=1, n=2 and verify

When n=1 , =1 2) gives answer 1

When n=2 , +=1+= option 2) gives

50) Ans: c

(1+2+3+……+n)+( +…..+)= =

51) Ans: d

(2 ,simplifying we get , clearly this holds good for n=1

52) Ans:c T2= S2-S1

53) Ans:c ar3=p ,ar6=q , ar9=r => pr= a2r12=q2

54)Ans:a a+6d =40 S13=13/2[2a+12d]

55) Ans:d

56) Ans:b a+5d =61 and a+9d =105 , solve it

57) Ans:a

58) Ans:a use result:

59) Ans:b put n=2

60) Ans:b using method of differences

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