NARAYANA IIT ACADEMY INDIA AP & TS

44 YEARS OF EXCELLENCE

TOPIC: SERIES & SEQUENCE

1. The 1025^{th} term in the sequence 1, 22, 4444, 88888888, ... is
   1) 2^9 2) 2^{10} 3) 2^{11} 4) 2^{12}

2. If $1 + \lambda + \lambda^2 + \ldots + \lambda^n = (1 + \lambda)(1 + \lambda^2)(1 + \lambda^4)(1+\lambda^8)(1 + \lambda^{16})$, then the value 'n' is (where $n \in N$)
   1) 32 2) 16 3) 31 4) 15

3. If $x = \sum_{n=0}^{\infty} a^n$, $y = \sum_{n=0}^{\infty} b^n$, $z = \sum_{n=0}^{\infty} c^n$, where a, b, c are in AP such that $|a| < 1$, $|b| < 1$, and $|c| < 1$, then x, y, z are in
   1) AP 2) GP 3) HP 4) none of these

4. The coefficient of x^{203} in the expansion of $(x - 1)(x^2 - 2)(x^3 - 3) \ldots . (x^{20} - 20)$ is
   1) – 35 2) 21 3) 13 4) 15

5. If the sum of 'n' terms of the series $\frac{1}{1^3} + \frac{1+2}{1^3+2^3} + \frac{1+2+3}{1^3+2^3+3^3} + \ldots . .$ is S_n, then S_n exceeds 199 for all 'n' greater than
   1) 99 2) 50 3) 199 4) 100

6. The numbers $3^{2\sin 2x - 1}$, 14, $3^{4 - 2\sin 2x}$ from first three terms of an AP, its 5^{th} term is equal to
   1) – 25 2) – 12 3) 40 4) 53

7. Let $S = \frac{8}{5} + \frac{16}{65} + \ldots + \frac{128}{2^{18}+1}$, then
   1) $S = \frac{1088}{545}$ 2) $S = \frac{545}{1088}$ 3) $S = \frac{1056}{545}$ 4) $S = \frac{545}{1056}$

8. The sum of the infinite terms of the series $\frac{5}{3^2.7^2} + \frac{9}{7^2.11^2} + \frac{13}{11^2.15^2} + \ldots\ldots$ is
   1) $\frac{1}{18}$ 2) $\frac{1}{36}$ 3) $\frac{1}{54}$ 4) $\frac{1}{72}$

9. If an AP, $a_7 = 9$ if $a_1 a_2 a_7$ is least, the common difference is
   1) $\frac{13}{20}$ 2) $\frac{23}{20}$ 3) $\frac{33}{20}$ 4) $\frac{43}{20}$

10. The roots of equation $x^2 + 2(a - 3)x + 9 = 0$ lie between – 6 and 1 and 2, $h_1, h_2, \ldots ., h_{20}$, $[a]$ are in HP, where $[a]$ denotes the integral part of a and 2, $a_1, a_2, \ldots . . , a_{20}$, $[a]$ are in AP, then $a_3 h_{18}$ is equal to
    1) 6 2) 12 3) 3 4) 10

11. Given that $0 < x < \frac{\pi}{4}$ and $\frac{\pi}{4} < y < \frac{\pi}{2}$ and $\sum_{k=0}^{\infty} (-1)^k \tan^{2k} x = a$, $\sum_{k=0}^{\infty} (-1)^k \cot^{2k} y = b$, then $\sum_{k=0}^{\infty} \tan^{2k} x \cot^{2k} y$ is
    1) $\frac{1}{a} + \frac{1}{b} - \frac{1}{ab}$ 2) $a + b - ab$ 3) $\frac{1}{\frac{1}{a} + \frac{1}{b} - \frac{1}{ab}}$ 4) $\frac{ab}{a+b-1}$

12. The sum of the series $\sqrt{3} + 3\sqrt{2} + 6\sqrt{3} + \ldots\ldots$ up to 16 terms
    1) 335923 $(\sqrt{18} + \sqrt{3})$ 2) 335923 $\sqrt{18}$ 3) 335923 $\sqrt{3}$ 4) none of these

13. Sum of certain number of terms n, of the series $\frac{2}{9}, \frac{-1}{3}, \frac{1}{2}, \ldots$ is $\frac{55}{72}$, then n =
    1)4 2) 5 3) 6 4) 1

14. Let $P = 3^{\frac{1}{3}} . 3^{\frac{2}{9}} . 3^{\frac{3}{27}} \ldots . \infty$, then $P^{\frac{1}{3}}$ is equal to :
1) $3^{\frac{1}{3}}$ 2) $3^{\frac{1}{4}}$ 3) $3^{\frac{1}{2}}$ 4) $3^{\frac{1}{6}}$

15. If $4a^2 + 9b^2 + 16c^2 = 2\,(3ab + 6\,bc + 4ca)$, where *a, b, c* are non-zero real numbers, then *a, b, c* are in :
1) A.P 2) G.P 3) H.P 4) none of these

16. Find the sum of first 24 terms of the A.P a_1, a_2, a_3 …….. if it is known that
$a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$
1) 600 2) 700 3) 900 4) none of these

17. If S_1, S_2, S_3 are the sums of *n*, 2*n*, 3*n* terms respectively of an A.P., then $\frac{S_3}{(S_2 - S_1)} =$
1) 1 2) 2 3) 3 4) none of these

18. If $1 . 3 + 3 . 3^2 + 5 . 3^2 + 7 . 3^4 + \ldots .$ upto 'n' terms is equal to $3 + (n - 1) . 3^b$, then $b =$
1) $n - 1$ 2) $n + 1$ 3) $2n + 1$ 4) none of these

19. The value of $S = \frac{5}{1^2 . 4^2} + \frac{11}{4^2 . 7^2} + \frac{17}{7^2 . 10^2} + \ldots . \infty$ is
1) 1 2) 1/2 3) 1/3 4) 1/4

20. The sum of $(x + 2)^{n-1} + (x + 2)^{n-2}(x + 1) + (x + 2)^{n-3}(x + 1)^2 + \ldots . + (x + 1)^{n-1}$ is equal to
1) $(x + 2)^{n-2} - (x + 1)^n$ 2) $(x + 2)^{n-2} - (x + 1)^{n-1}$ 3) $(x + 2)^n - (x + 1)^n$ 4) none of these

21. If $a_i > 0$, $i = 1, 2, 3, \ldots\ldots, 50$ and $a_1 + a_2 + a_3 + \ldots . . + a_{50}$, then the minimum value of $\frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3} + \ldots + \frac{1}{a_{50}}$ is equal to

22. If $\sum_{n=1}^{k} \left[\frac{1}{3} + \frac{n}{90} \right] = 21$, where [*x*] denotes the integral part of *x*, then '*k*' is equal to

23. Let $S_k : k = 1, 2, \ldots . ., 100$ denotes the sum of the infinite G.P, whose first term is $\frac{k-1}{k!}$ and the common ratio is $\frac{1}{k}$. Then the value of $\frac{100^2}{100!} + \sum_{k=1}^{100} |(k^2 - 3k + 1) S_k|$ is :

24. The length of three unequal edges of a rectangular solid block are in G.P. The volume of the block is 216 cm^3 and the total surface area is 252 cm^2. The length of the longest edge is

25. Let A_n be the sum of the first *n* terms of the geometric series $704 + \frac{704}{2} + \frac{704}{4} + \frac{704}{8} + \ldots .$ and B_n be the sum of the first *n* terms of the geometric series $1984 - \frac{1984}{2} + \frac{1984}{4} - \frac{1984}{8} + \ldots . .$
If $A_n = B_n$, then the value of '*n*' is (where $n \in N$)

26. The value of $\sum_{i=1}^{n} \sum_{j=1}^{i} \sum_{k=1}^{j} 1 = 220$, then the value of 'n' equals

27. If $\sum_{r=1}^{n} \frac{r^4 + r^2 + 1}{r^4 + r} = \frac{675}{26}$, then '*n*' is equal to

28. If *x, y, z* and *w* are positive integers such that $x + 2y + 3z + 4w = 50$, then maximum value of $\left(\frac{x^2 y^4 z^3 w}{16} \right)^{1/10}$ is

29. If $\sum_{k=1}^{n} \left(\sum_{m=1}^{k} m^2 \right) = an^4 + bn^3 + cn^2 + dn + e$, then $a + b + c + d + e =$

30. Let $U_n = \frac{(n+1)!}{(n+3)!}$, $n \in N$, if $S_n = \sum_{n=1}^{n} U_n$, then $\lim_{n \to \infty} S_n$ equals

FUNCTIONS

1. $f:R\to R\ f(x)=\dfrac{x^5}{1+x^5}$ then f is_____

1) one-one but not onto 2) on to but not one-one 3) bijection 4) neither one-one nor onto

2. the function $f(x)=\dfrac{a^x+a^{-x}}{a^x-a^{-x}}$ is _____

1) an even function 2) an old function 3) neither even nor odd 4) none

3. If $f(x)=\dfrac{3x+4}{2x-3}$ then fof of (3)=_____

1) 3 2) $\dfrac{13}{3}$ 3) 13 4) $\dfrac{1}{3}$

4. $g(x)=3\sqrt{x^2+1}\ f(x)=\sqrt{x^3-2}$ then $fog(-4)$

1) $\sqrt{15}$ 2) $3\sqrt{63}$ 3) $3\sqrt{17}$ 4) $\sqrt{63}$

5. $f(x)=\log\left(\dfrac{1+x}{1-x}\right)$ then $f\left(\dfrac{x_1+x_2}{1+x_1x_2}\right)$

1) 0 2) $f(x_1)f(x_2)$ 3) $f(x_1)+f(x_2)$ 4) $f(x_1x_2)$

6. If $f(x)=\log\left(\dfrac{1+x}{1-x}\right)\ g(x)=\dfrac{3x+x^3}{1+3x^2}$ then $fog(x)$

1) $-f(x)$ 2) $3f(x)$ 3) $(f(x))^3$ 4) none

7. The domain of the function $f(x)=\sqrt{16-9x^2}$

1) $\left[-\dfrac{4}{3},\dfrac{4}{3}\right]$ 2) $\left[\dfrac{4}{3},\dfrac{4}{3}\right]$ 3) $R-\left[-\dfrac{4}{3},\dfrac{4}{3}\right]$ 4) $R-\left[\dfrac{-4}{3},\dfrac{4}{3}\right]$

8. The domain of the function $f(x)=\dfrac{1}{\sqrt{64-x^2}}$ is_____

1) (-8 8) 2) $[-8,8]$ 3) $R-(-8,8)$ 4) $R-[-8,8]$

9. The domain of the function $f(x)-\dfrac{1}{\sqrt{x^2-81}}$ is _____

1) $[-9,9]$ 2) (-9 9) 3) $R-$(-9 9) 4) $R-[-9,9]$

10. Domain of the function $f(x)=\log|x|$ is_____

1) R 2) $R-\{0\}$ 3) R^+ 4) None

11. Domain of the function $f(x)=\dfrac{x}{\sqrt{|x|-x}}$ is _____

1) $[0\infty)$ 2) $(-\infty 0)$ 3) $(-\infty 0]$ 4) $[1\infty)$

12. Domain of the function $f(x)=\dfrac{1}{\log(1-x)}$ is

1) $(-\infty 1)$ 2) $(-\infty 0)\cup(01)$ 3) (1∞) 4) $(-\infty -1)$

13. The range of $f(x)=\sin^2 x+\cos^4 x$ is_____

1) $\left[\dfrac{1}{4}1\right]$ 2) $\left[\dfrac{3}{4}1\right]$ 3) $\left[\dfrac{1}{4}\dfrac{3}{4}\right]$ 4) $[01]$

14. The range of $f(x)=\dfrac{1}{2-\cos 3x}$ is _____

1) $\left[0\frac{1}{3}\right]$ 2) $\left[\frac{1}{3}1\right]$ 3) $\left[\frac{1}{3}3\right]$ 4) $[01]$

15. Find the range of $f(x)=\frac{1}{2-\cos 3x}$ is _____

1) $\left[0\frac{1}{3}\right][0$ 2) $\left[\frac{1}{3}3\right]$ 3) $\left[\frac{1}{3}3\right]$ 4) $[01]$

16. The range of the function $f(x)=\frac{x^2-x+1}{x^2+x+1}$

1) $\left[\frac{1}{3}3\right]$ 2) $\left[\frac{1}{3}1\right]$ 3) $[1\ 3]$ 4) none

17. If $a^2+b^2+c^2=1$ then the range of $ab+bc+ca$ is_____

1) $\left[-\frac{1}{2}1\right]$ 2) $\left[-\frac{1}{2}\frac{1}{2}\right]$ 3) $[-1\ 1]$ 4) $[0\ 1]$

18. If $f(x)=\frac{2x+3}{3x-2}$ then $f^{-1}(x)=$

1) $\frac{5x+3}{3x-2}$ 2) $\frac{5x+3}{3-2x}$ 3) $\frac{3x-2}{5x+3}$ 4) $\frac{3-2x}{5+3x}$

19. If $f(x)=x-x^2+x^3-x^4+.....$ and $|x|<1$ then $f^{-1}(1)=$

1) $\frac{x}{x-1}$ 2) $\frac{x-1}{x}$ 3) $\frac{x}{1+x}$ 4) $\frac{x}{1-x}$

20. The function $f(x)$ is defined as $f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}$ when $x\neq 0$ then the function is

1) $f(x)=x^2-2$ 2) $f(x)=x^2+1$ 3) $f(x)=x^2+2$ 4) $f(x)=x+\frac{1}{x}$

21. $f(x)=\frac{\cos^2 x+\sin^4 x}{\sin^2 x+\cos^4 x}$, $f(x)$ $x\in R$ then $f(2002)$

1) 1 2) 2 3) 3 4) 4

22. If $f(x)=\frac{2^x+2^{-x}}{2}$ then $f(x+y)+f(x-y)$

1) $2f(x)f(y)$ 2) $f(x)f(y)$ 3) $\frac{1}{2}f(x)f(y)$ 4) none

23. $f(x)f\left(\frac{1}{x}\right)=4$ and $f(x)>0$ for $x>0$ $f(2)=8$ then $f(2)=8$

1) 25 2) 5 3) 50 4) 32

24. Let $g(x)=1+x-[x]$ and $f(x)=\begin{cases}-1 & x<0\\ 0 & x=0\\ 1 & x>0\end{cases}$ then for all x $f[g(x)]$ is equal to

1) x 2) 1 3) $f(x)$ 4) $g(x)$

25. $f:R\to R$ is given by $f(x)=\frac{4^x}{4^x+2}$ for all $x\in R$ the $f\left(\frac{1}{1997}\right)+f\left(\frac{2}{1997}\right)+.....+f\left(\frac{1996}{1997}\right)=$

1) 997 2) 1998 3) 1997 4) 998

26. $f:R\to R$ is given by $f(x)=\frac{9^x}{9^x+3}$ for all $x\in R$ the $f\left(\frac{1}{1996}\right)+f\left(\frac{2}{1996}\right)+.....+f\left(\frac{1995}{1996}\right)=$

1) 997.5 2) 998 3) 997 4) 998.5

27. If $f\left(\frac{x^2-1}{x^2+1}\right)=2$ for all x. Then

1) $f(x)=x^2\,(x\in R)$ 2) $f(x)=2(-1\le x\le 1)$

3) $f(x)=\frac{x^2-1}{x^2+2}(-1\le x<1)$ 4) none of the above

28. The range of function $f(x)=4^x+2^x+4^{-x}+2^{-x}+3$ is

1) $\left[\frac{3}{4}\ \infty\right)$ 2) $\left(\frac{3}{4}\ \infty\right)$ 3) $(7\ \infty)$ 4) $[7\ \infty]$

29. The domain of the function $f(x)=\log_{2x-1}(x-1)$ is

1) $(1\ \infty)$ 2) $\left(\frac{1}{2}\ \infty\right)$ 3) $(0\ \infty)$ 4) none of these

30. $f:R\to R$, $g:R\to R$ defined by $f(x)=2x+1, g(x)=x^2+1$. Then arrange the following is ascending order

a) $fog(2)$ b) $gof(3)$ c) $gof(-1)$ d) $fog(-2)$

MOTION IN A STRAIGHT LINE

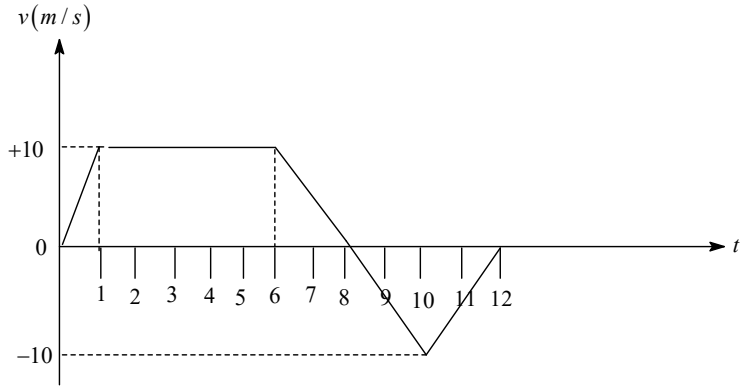
1. From metro station 'A', a metro train starts at regular interval of 10 min and runs towards 'B' metro station with constant speed of 80 kmh^{-1} without any stoppage. At some point of time, all the trains simultaneously have to reduce their speed 50 kmh^{-1} due to defect in rails. What will become the time intervals between arrivals of the trains at the metro station 'B' during the defect in rails?

A) $\frac{8}{3}$min B) $\frac{4}{15}$min C) 16 min D) 4 min

2. The relation between time and distance is $t=\alpha x^2+\beta x$, where α and β are constants. The retardation is

A) $2\alpha v^3$ B) $2\beta v^3$ C) $2\alpha\beta v^3$ D) $2\beta^2 v^3$

3. The velocity-time graph of a body moving along a straight line is given below. The average velocity in whole motion is



A) 60 ms^{-1} B) 20 ms^{-1} C) 6.67 ms^{-1} D) 3.33 ms^{-1}

4. An engine of a train, moving with uniform acceleration passes the signal-post with velocity u and the last compartment with velocity v.The velocity with which middle point of the train passes the signal post is

A) $\sqrt{\frac{v^2+u^2}{2}}$ B) $\frac{v-u}{2}$ C) $\frac{u+v}{2}$ D) $\sqrt{\frac{v^2-u^2}{2}}$

5. A balloon is at a height of 40 m and is ascending with a velocity of 10 ms^{-1}. A bag of 5 kg weight is dropped from it. The body reach the surface of the earth after_____

A) 2 s B) 4 s C) 0.25 s D) 1 s

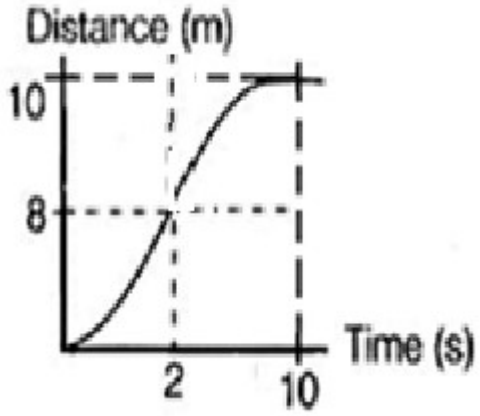
6. A car is moving towards check post with velocity 54 kmh^{-1}. When car is at 400 m from the check post, driver applied brakes which is caused of retardation of 0.3 ms^{-2}. The distance of the car from the check post for 2 min after applying the brakes

A) 375 m B) 25 m C) 400 m D) 775 m

7. An automobile travelling with a speed of 60 kmh^{-1}, can brake to stop within a distance of 20 m. If the car is going twice as fast i.e., 120 kmh^{-1}. The stopping distance is
A) 20 m B) 40 m C) 60 m D) 80 m

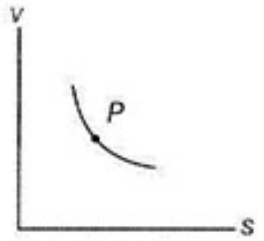
8. A 200 m long train starts from rest at t = 0 with constant acceleration 4 cms^{-2}. The head light of its engine is switched ON at t=60 s and its tail light is switched ON at t =120 s. the distance between these two events for an observer standing on platform
A) 72 m B) 288 m C) 266 m D) 16 m

9. The average speed in time interval t=2s to t=10 s



A) 0.25 ms^{-1} B) 0.50 ms^{-1} C) 4 ms^{-1} D) 25 ms^{-1}

10. A particle is moving on straight line whose velocity-displacement graph is shown in figure. At point P of graph $v = \sqrt{3} ms^{-1}$ and slope is $-\sqrt{3}$. The magnitude of acceleration at point P is



A) -3 ms^{-2} B) 3 ms^{-2} C) $-\sqrt{3}\, ms^{-2}$ D) $\sqrt{3}\, ms^{-2}$

11. A car moves for half of its time 80 km/h and for rest half of time at 40 km/h. The total distance covered is 60 km. The average speed of the car is
A) 180 km/h B) 120 km/h C) 80 km/h D) 60 km/h

12. A body covered a distance of 5 m along a semicircular path. The ratio of distance to displacement is
A) 5 : 10 B) 10 : 5 C) 11 : 7 D) 7 : 11

13. The displacement is given by $x = 2t^2 + t + 5$, the acceleration at $t = 2s$ is
A) $4 m/s^2$ B) $8 m/s^2$ C) $10 m/s^2$ D) $15 m/s^2$

14. A particle is moving in a straight line and passes through a point O with a velocity of 6 ms^{-1}. The particle moves with a constant retardation of 2 ms^{-2} for 4s and there after moves with constant velocity. How long after leaving O does the particle return to O?
A) 3s B) 8s C) never D) 4s

15. A body falls freely from the top of a tower. It covers 36 % of the total height in the last second before striking the ground level. The height of the tower is
A) 50 m B) 75 m C) 100 m D) 125 m

16. A ball is projected upwards from a height 'h' above the surface of the earth with velocity 'v'. The time at which the ball strikes the ground is
A) $\frac{v}{g} + \frac{2hg}{\sqrt{2}}$ B) $\frac{v}{g}\left[1 - \sqrt{1 + \frac{2h}{g}}\right]$ C) $\frac{v}{g}\left[1 + \sqrt{1 + \frac{2gh}{v^2}}\right]$ D) $\frac{v}{g}\left[1 + \sqrt{v^2 + \frac{2g}{h}}\right]$

17. A player throws a ball upwards with an initial speed of 29.4 m/s. The velocity and acceleration of the ball at the highest point of its motion are (take g=9.8 m/s^2)
A) zero,zero B) 9.8 m/s,zero C) zero, 9.8 m/s^2 D) 9.8 m/s, 9.8 m/s^2

18. If the velocity of a body related to displacement ' x ' is given by $v = \sqrt{5000 + 24x}$ m/s then the acceleration of the body is _____ m/s^2
A) 6 B) 12 C) 18 D) 24

19. A particle starts from rest with an acceleration $2ms^{-2}$. The acceleration of the particle decreases down to zero uniformly during time interval of 4s. the velocity of particle (in ms^{-1}) after 2s
A) 1 B) 2 C) 3 D) 4

20. A train travels from city A to city B with constant speed of $10ms^{-1}$ and return back to city A with a constant speed of 20 ms^{-1}. The average speed during its entire journey
A) $\frac{20}{3} m/s$ B) $\frac{40}{3} m/s$ C) $20\ m/s$ D) $40\ m/s$

21. A car takes 20 s to move around a roundabout of radius 14m.The magnitude of average velocity is
A) 4.4 m/s B) 8.8 m/s C) 2.2 m/s D) zero

22. Consider a particle initially moving with a velocity of 5 m/s starts retardation at a constant rate of 2 m/s^2. The distance travelled in the 2^{nd} second is
A) 14 m B) 7 m C) 4.5 m D) 2 m

23. Consider a particle initially moving with a velocity of 5 m/s starts retardation at a constant rate of 2 m/s^2. Determine the time at which the particle becomes stationary
A) 2.5 s B) 2.8 s C) 4.35 s D) 4.6 s

24. A balloon starts rising upward with constant acceleration 'a' and after 't_0' second, a packet is dropped from it which reaches the ground after 't' second. The value of 't' is
A) $\frac{a}{g}\left[t_0 + \sqrt{1 + \frac{g}{a}}\right]$ B) $\frac{at_0}{g}\left[t_0 + \sqrt{1 + \frac{g}{a}}\right]$ C) $\frac{t_0}{g}\left[a + \sqrt{1 + \frac{g}{a}}\right]$ D) t_0

25. Two balls of different masses m_1 and m_2 are dropped from two different heights h_1 and h_2 respectively. The ration of time taken by the two balls to drop through these distances is
A) $\frac{t_1}{t_2} = \sqrt{h_1 h_2}$ B) $\frac{t_1}{t_2} = h_1.h_2$ C) $\frac{t_1}{t_2} = \sqrt{\frac{h_1}{h_2}}$ D) $\frac{t_1}{t_2} = \sqrt{\frac{h_2}{h_1}}$

26. A swimmer capable of swimming with velocity 'v' relative to water jumps in a flowing river having velocity 'u'. The man swims a distance 'd' downstream and returns back to the original position. The tine taken in complete motion is
A) $\frac{d}{v+u}$ B) $\frac{d}{v-u}$ C) $\frac{2d}{v^2 - u^2}$ D) $\frac{2d}{v^2 + u^2}$

27. Two buses of equal 5 m lengths are moving with the same velocity in the same direction on a highway. The first bus is 40 m ahead of the second bus. The driver of the second bus thinks to overtake the first bus and gives an acceleration of $1ms^{-2}$ to the bus. After what time the second bus just passes the first bus?
A) 4.75 sec B) 9.48 sec C) 12.35 sec D) 10.5 sec

28. A summer moving upstream passes a float at point P. After two hours, he returns and at this instant he meets the float again at a distance 15 km from the point P. If the swimmer velocity in water remains constant, then the speed of river flow is
A) 7.5 km/h B) 4.5 km/h C) 4.75 km/h D) 3.75 km/h

29. The distance travelled by a particle is related to time t as $x = 4t^2$. The velocity of the particle at $t = 5s$ is
A) $40 ms^{-1}$ B) $25 ms^{-1}$ C) $20 ms^{-1}$ D) $8 ms^{-1}$

30. For a train engine moving with speed of 20 ms^{-1} the driver must apply brakes at a distance of 500 m before the station for the train to come to rest at the station. If the brakes were applied at half of this distance, the train engine would cross the station with speed $\sqrt{x}$ ms^{-1}. The value of x is_____
A) 200 B) 250 C) 400 D) 450

TOPIC: MOTION IN A PLANE

1. Three vectors each of $\bar{a}$ acting at a point simultaneously are represented by the closed triangle in the same order. If one of the vectors is reversed in order, the magnitude of their resultant vector is
1) a 2) 2a 3) 3a 4) zero

2. Three vectors are given as $\overline{P}=3\hat{i}-4\hat{j},\overline{Q}=6\hat{i}-8\hat{j}$ and $\hat{R}=\frac{3}{4}\hat{i}-\hat{j},$ the correct statement is

1) $\overline{P},\overline{Q}$ and $\overline{R}$ are equal vectors 2) $\overline{P}$ and $\overline{Q}$ are parallel but R is not parallel

3) $\overline{P},\overline{Q}$ and $\overline{R}$ are parallel 4) R is the resultant of $\overline{P}$ and $\overline{Q}$

3. Two vectors $\overline{A}$ and $\overline{B}$ have equal magnitudes. The magnitude of $(\overline{A}+\overline{B})$ is 'n' times the magnitude of $(\overline{A}-\overline{B})$. The angle between $\overline{A}$ and $\overline{B}$ is

1) $\sin^{-1}\left[\frac{n^2-1}{n^2+1}\right]$ 2) $\sin^{-1}\left[\frac{n-1}{n+1}\right]$ 3) $\cos^{-1}\left[\frac{n^2-1}{n^2+1}\right]$ 4) $\cos^{-1}\left[\frac{n-1}{n+1}\right]$

4. If the magnitudes of $\overline{A},\overline{B}$ and $\overline{C}$ are 12,5 and 13 units respectively and $\overline{A}+\overline{B}=\overline{C},$ then the angle between $\overline{A}$ and $\overline{B}$ is

1) 0 2) $\pi/2$ 3) π 4) $\pi/4$

5. Two vectors $\overline{A}$ and $\overline{B}$ are inclined at an angle 'θ' and $\overline{R}$ is their resultant keeping the magnitudes and angle between the vectors same, if the direction of $\overline{A}$ and $\overline{B}$ is inter changed, then there is a change with regard R in

1) Magnitude 2) Direction 3) Both magnitude and direction 4) None of the above

6. Rain is falling vertically with a speed of $35ms^{-1}$. A woman rides a bicycle with a speed of $12ms^{-1}$ in east to west direction. The direction in which she would hold her umbrella is

1) at $\cos^{-1}(0.343)$ with vertical towards east 2) at $\tan^{-1}(0.343)$ with vertical towards west

3) at $\cos^{-1}(0.343)$ with vertical towards west 4) at $\tan^{-1}(0.343)$ with vertical towards east

7. Buses A and B are moving with velocities $20\hat{i}\ m/s$ and $15\hat{i}\ m/s$ respectively. Then, relative velocity of A w.r.t. B is

1) $5\hat{i}\ m/s$ 2) $5\hat{j}\ m/s$ 3) $-5\hat{i}\ m/s$ 4) $-5\hat{j}\ m/s$

8. A river is flowing from west to east at a speed of $5m/s$. A man on the South bank of the river, capable to swim at $10m/s$ in still water, wants to swim at $10m/s$ in still water, wants to swim across the river in shortest time. He should swim in a direction

1) due north 2) 30^0 east of north 3) 30^0 west of north 4) 60^0 east of north

9. Person aiming to reach the exactly opposite point on the bank of a stream is swimming with a speed of 0.5m/s. at an angle of 120^0 with the direction of flow of water, the speed of water in the stream is

1) 1m/s 2) 0.67m/s 3) 0.433m/s 4) 0.25m/s

10. A man moves on a cycle with a velocity of 4Kmph the rain appears to fall on him with a velocity of 3Kmph vertically. The actual velocity of the rain is

1) 7Kmph 2) 5Kmph 3) $\frac{4}{3}$ Kmph 4) $\frac{3}{4}$ Kmph

11. A ball is projected with velocity $10ms^{-1}$ in a direction making an angle 30^0 with the horizontal, what is the position coordinate (in metres) of the ball after 1s?

1) (8.66,0.1) 2) (9.8,1.0) 3) 4.26,5.29) 4) (0.4,8.66)

12. A projectile is given an initial velocity of $(\hat{i}+2\hat{j})ms^{-1}$ where $\hat{i}$ is along the ground and $\hat{j}$ is along vertical. If $g=10ms^{-2}$, the equation of its trajectory is

1) $y=x-5x^2$ 2) $y=2x-5x^2$ 3) $4y=2x-5x^2$ 4) $4y=2x-25x^2$

13. At what angle with the horizontal should a ball be thrown so that its range 'R' is related to the time flight as $R=5T^2$ take $g=10m/s^2$

1) 30^0 2) 45^0 3) 60^0 4) 90^0

14. A ball is thrown with a velocity of 20m/s making an angle 30^0 with the horizontal. Its velocity vector will be normal to its initial velocity vector after a time interval of $\left[g=10m/s^2\right]$

1) 4S 2) 1S 3) 1.5S 4) 0.25S

15. The path of projectile is given by the equation $y=\sqrt{3}x-0.8x^2$. its velocity of projection is $\left[g=10m/s^2\right]$
1) 5m/s 2) 2.5m/s 3) 7.5m/s 4) 4m/s

16. A ball is projected upwards from the top of a tower with a velocity 50m/s making an angle 30^0 with the horizontal. The height of the tower is 70m. after how many seconds from the instant of throwing will the ball reach the ground?
1) 2s 2) 5s 3) 7s 4) 9s

17. The x and y - coordinates of the particle at any time are $x=5t-2t^2$ and $y=10t$ respectively, where x and y are in metres and t in seconds. The acceleration of the particle at $t=2s$ is
1) 0 2) $5ms^{-2}$ 3) $-4ms^{-2}$ 4) $-8ms^{-2}$

18. Rain is falling vertically with a speed of $5ms^{-1}$. Winds starts blowing after sometime with a speed of $12ms^{-1}$ in east to west direction. In which direction from vertical should boy waiting at a bus stop hold his umbrella?
1) $\tan^{-1}(0.45)$, west 2) $\tan^{-1}(0.343)$, west 3) $\tan^{-1}(2.4)$ west 4) $\tan^{-1}(0.24)$, east

19. The position of a particle is given by $r=3t\hat{i}+2t^2\hat{j}+5\hat{k}$, then the direction of $v(t)$ at $t=1s$ in
1) 45^0 with X-axis 2) 63^0 with Y-axis 3) 30^0 with Y-axis 4) 53^0 with X-axis

20.` Two stones were projected simultaneously in the same vertical plane from same point obliquely, with different speeds and angles with the horizontal. The trajectory of path followed by one, as seen by the other, is
1) parabola 2) straight line 3) circle 4) hyperbola

21. A car driver is moving towards a fired rocket with a velocity of 8m/s. He observed the rocket to be moving with a speed of 10m/s. A stationary observer will see the rocket to be moving with a speed in m/s is

22. A man standing on a road has to hold his umbrella at 30^0 with the vertical to keep the rain away. He throws the umbrella and starts running at 10 kmh^{-1}. He finds that rain drops are hitting his head vertically. The actual speed of raindrops in kmph is

23. A girl can swim with speed $5kmh^{-1}$ in still water. She crosses a river 2km wide, where the river flows steadily at $2kmh^{-1}$ and she makes strokes normal to the river current. Find how far down the river she go when she reaches the other bank in metre is

24. The speed of a boat is 5Kmph in still water. If it crosses a river of width 1 km along the shortest possible path in 15 minutes. Then velocity of the river in Kmph is

25. To a person going east in a car with a velocity of 25 Kmph a train appears to move towards north of 25 Kmph a train appears to move towards north with a velocity of $25\sqrt{3}$ Kmph. The actual velocity of the train will be in Kmph

26. The equations of motion of a projectile are given by $x=18t$ and $2y=54t-9.8t^2$. The angle θ of projection is $\mathrm{Tan}^{-1}(x)$. The value of x is

27. The path of projectile is given by the equation $y=x-0.1x^2$. its time of flight is $\left[g=10m/s^2\right]$

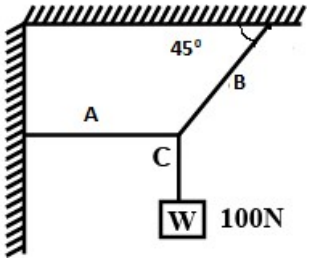
28. A ball is projected from the top of a tower with a velocity $\hat{i}+2\hat{j}+5\hat{k}\,m/s$, where $\hat{i},\hat{j}$ and $\hat{k}$ are unit vectors along east, north and vertically upwards respectively. If the height of the tower is 30m, its time of flight in sec is $(g=10m/s^2)$

29. A particle is projected from the ground with an initial velocity $\sqrt{7}\,m/s$ at an angle 60^0 with horizontal. The average velocity of the pariticle if it reaches the maximum height is

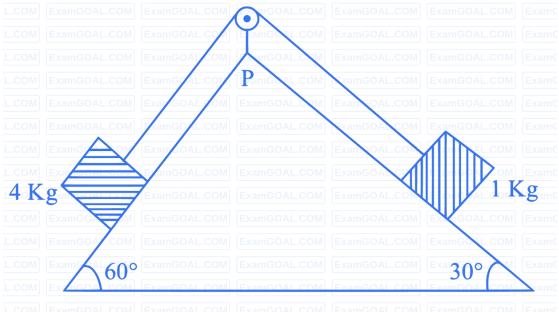
30. A particle is moving such that its position coordinates (x,y) are $(2m,3m)$ at $t=0\,s$, $(6m,7m)$ at times $2s$ and $(13m,14m)$ at time $t=5s$. Average velocity vector (v_{av}) from $t=0s$ to $t=5\,s$ is $x(\bar{i}+\bar{j})$. The value of x is

TOPIC : NEWTON'S LAWS OF MOTION

1. A bullet 30 gm leaves the barrel of gun with a velocity of 900 m/sec. If the barrel of gun is 50 cm long and mass 9 kg then the value of impulse supplied to the gun will be
   A)27 NS B)6 NS C)36 NS D)3 NS
2. A body of mass 1000gm moves along x-axis such that it's velocity varies with displacement x according to the relation $V = 6\sqrt{x}\, m/\sec$ the force acting on the body is
   A) 20 N B)25 N C) 18 N D)50 N
3. At any instant the velocity of a particle of mass 200gm is $\left(4t\hat{i} + 5t^2\hat{j}\right)m/\sec$. If the force acting on the particle at t=3 sec is $\left(i + xj\right)N$. Then the value of x will be
   A)4 B)6 C)2 D)3
4. Force acts for 10sec on a body of mass 30kg, starting from rest, after which the force ceases and then body describes 100m in the next 5sec. the value of force will be
   A)10 N B)15 N C) 30 N D) 60 N
5. Two billiard balls each of mass 0.05kg moving in opposite direction with speed of 6m/sec collide and rebound with the same speed. What is the impulse imparted to each ball by the other(NS)
   A) $0.6\hat{i}\ Nsee, -0.6\hat{i}Nse$ B) $0.3\hat{i}. - 0.3\hat{i}$ C) $0.6\hat{j}, 0.3\hat{i}$ D) $0.5\hat{i}, -0.5\hat{i}$
6. A rocket of initial mass 6000kg ejects mass at a constant rate of 16kg/s with constant relative speed of 11 km/sec. what is the acceleration of the rocket a minute after the blast?(Neglect gravity)
   A) $50m/\sec^2$ B) $34.92m/\sec^2$ C) $44.92m/\sec^2$ D) $20m/\sec^2$
7. Find the tension in B cord as shown in figure. The weight of the suspended body is 100N.

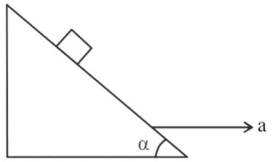


   A)100N B) $200\sqrt{2}N$ C) $100\sqrt{2}N$ D) $400N$
8. The position vector of a particle related to time t is given by $\vec{r} = \left(10t^2\hat{i} + 20t\hat{j} + 7\hat{k}\right)m$ the direction of net force experienced by the particle is
   A)Positive y-axis B)Positive x-axis C)Positive z-axis D)In x-y plane
9. A particle of mass m is acted upon by a force F given by the empirical law $F = \frac{R}{t^2}V(t)$. If the law is to tested experimentally by t^2 observing the motion starting from rest, the best way is to plot:
   A)V(t) against t^2 B)log(t)against $\frac{1}{t^2}$ C)Log V(t)against $\frac{1}{t}$ D)LogV(t)against t
10. As per given figure, a weight less pulley p is attached on a double inclined frictionless surface. The tension in the string (mass less) will be (g=10 m/sec^2)



A) $\left(4\sqrt{3}+1\right)$N B) $4\left(\sqrt{3}+1\right)N$ C) $4\left(\sqrt{3}-1\right)N$ D) $\left(4\sqrt{3}-1\right)N$

11. A block is kept on a frictionless inclined surface with angle of inclination 'α'. The incline is given an acceleration 'a' to keep the block stationary. Then a is equal to

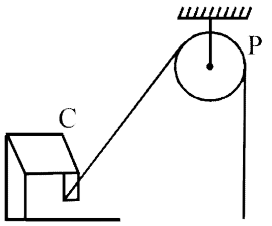


A) $g\ \mathrm{Tan}\,\alpha$ B) $g\cos ec\,\alpha$ C) $\frac{g}{\mathrm{Tan}\,\alpha}$ D)g

12. A mass of 20kg is suspended vertically by a rope of length 6m from the roof. A force of 50 N is applied at the middle point of a rope in horizontal direction. The angle made by upper half of the rope with vertical is $\theta = \tan^{-1}\left(x\times 10^{-2}\right)$. The value of x is ____(given g=10m/sec^2)

A)30 B)20 C)15 D)25

13. One end of a massless rope, which passes over a massless and frictionless pulley P is tied to a hook C while the other end is free. Maximum tension that the rope can bear is 360N. With what value of maximum safe acceleration (in ms^{-2})can a man of 60kg climb on the rope?

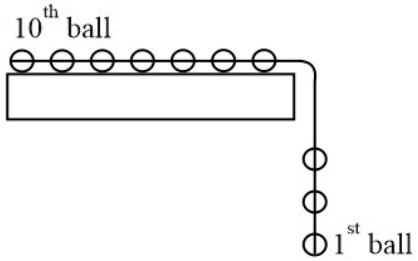


A)16 B)6 C)4 D)8

14. A block of metal weighing 2kg is resting on a frictionless plane. It is struck by a jet releasing water at a rate of 1kg/sec and at a speed of 5m/sec. the initial acceleration of the block will be (m/sec^2)

A)2.5 B)3.5 C)4.5 D)1.5

15. A system of 10 balls each of mass 2kg are connected via massless and stretchable string. The system is allowed to slip over the edge of a smooth table as shown in figure. Tension on the string between the 7th and 8th ball is _____N when 6th ball just leaves the table



A)26 N B)36 N C)50 N D)20 N

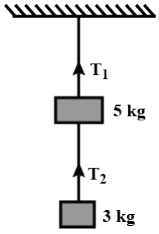
16. A man of 50kg is running on the road and suddenly jumps in to a stationary trolly car of mass 100kg. then the trolly car starts moving with velocity 4m/sec. the velocity of running man was_____m/sec. when he jumps in to the car.

A)6 m/sec B)3 m/sec C)12 m/sec D)10 m/sec

17. A spaceship in space sweeps stationary inter planetary dust. As a result its mass increases at a rate $\frac{dM(t)}{dt} = bV^2(t)$, where V(t) is its instantaneous velocity. The instantaneous acceleration of the satellite is

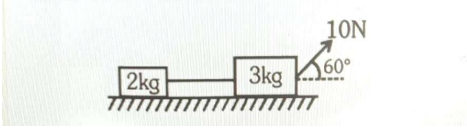
A) $-bv^3(t)$ B) $-\frac{bv^3}{M(t)}$ C) $-\frac{2bv^3}{M(t)}$ D) $-\frac{bv^3}{2M(t)}$

18. Two masses of 5kg and 3kg are suspended with the help of massless inextensible string as shown in figure. Calculate T_1 & T_2 when whole system is going upwards with acceleration $= 2m/\sec^2$ (use $g = 9.8m/\sec^2$)



A)94.4N,35.4N B)110N, 120 N C)74.4N,25.4N D)25.4N.74.4N

19. Find the tension in the string which connected the blocks as shown in the following figure.



A)2 N B)3 N C)5 N D)10 N

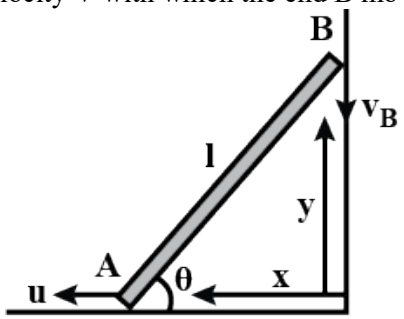
20. A particle moves xy-plane under the influence of a force such that its linear momentum is $\vec{p}(t) = A\left[\hat{i}\cos(kt) - \hat{j}\sin(kt)\right]$, where A and K are constant. The angle between the force and the momentum is

A) 0^0 B) 30^0 C) 45^0 D) 90^0

21. Two weight are suspended from a string thrown over a light frictionless pulley. The mass of one weight is 2kg. If a heavy weight is attached to its other end, the tension in the string is (g=10 m/sec^2)

A)Zero B)20 N C)40 N D)50 N

22. A rod AB of length L is leaning on a wall and the floor at an angle θ as shown fig. the end A is moved with a constant velocity u to left. Find the velocity V with which the end B moves downwards.

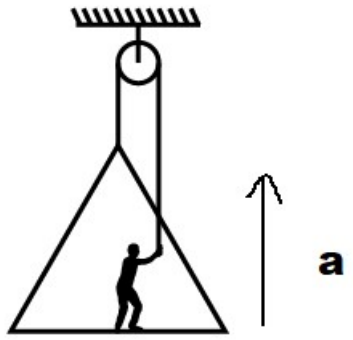


A) $V = u\cot\theta$ B) $V = 4\tan\theta$ C) $V = u$ D) $V = \sin\theta$

23. A thick uniform rope of mass 6kg and length 3m is hanging vertically from a rigid support. The tension in the rope at a point 1m from the support will be (Take g=10 m/sec^2)

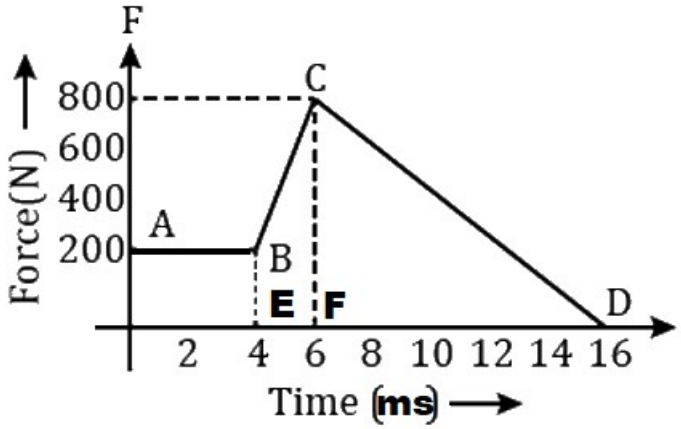
A)20 N B)30 N C)40 N D)60 N

24. A man of mass M stand on the floor of a box of mass m as shown in fig. he raises himself and the box with acceleration a=g/3 by means of a rope going over a fixed frictionless pulley. If the mass of the rope is negligible compared to (M+m) and if M=2m, the tension in the rope will be



A)2 mg B) $\frac{2mg}{3}$ C)mg D) $\frac{4mg}{3}$

25. The magnitude of Force F (in newton) acting on a body varies with time t(in millisecond) as shown in fig. find the magnitude of total impulse (in Ns) of the force on the body from t=4ms to t=16ms.



A)100Ns B)5Ns C)6Ns D)4Ns

26. A spring balance is attached to the ceiling of a lift. A man hangs his bag on the spring and the spring reads 100N, when the lift is stationary if the lift moves down wards with an acceleration of 5 m/sec^2, the reading of the spring balance will be

A)20 N B)50 N C) 60 N D) 70 N

27. A particle of mass 0.3kg subject to a force F=-kx, with K=15 N/m, what will be its initial acceleration if it is released from a point 20 cm away from the origin

A)15 m/sec^2 B)3 m/sec^2 C)10 m/sec^2 D)5 m/sec^2

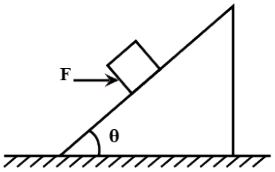
28. The momenta of a body in two perpendicular direction at any time 't' are given by $Px = 3t^2 + 6$ and $P_y = \frac{2+t^2+3}{2}$. The force acting on the body at $t = 1\text{sec}$

A) $2\sqrt{10}N$ B) $4\sqrt{10}N$ C)10 N D) $2\sqrt{2}N$

29. A ball of mass 0.2kg is thrown vertically upwards by applying a force by hand. If the hand moves 0.2 m while applying the force and the ball goes up to 2m height further, find the force magnitude of the force $\left(g = 10m/\sec^2\right)$.

A)4 N B)16 N C)20 N D)22 N

30. A block of mass 500 gm is kept stationary on a smooth inclined plane by applying a minimum horizontal force $F = \sqrt{x}N$ as shown in figure. The value of x is _____



A)10 B)25 C)15 D)30

TOPIC: METALLURGY

1) The Metal extracted by leaching with cyanide is
1) Mg 2) Ag 3) Cu 4) Na

2) For which of the following ores froath flotation method is used for concentration
1) Haematite 2) Zinc blende 3) Magnetite 4) Carnalite

3) During the process of electrolytic refining of copper, some metals present at impurity settle as 'anode mud'. These are
1) Pb & Zn 2) Sn & Ag 3) Fe & Ni 4) Ag & Au

4) Which of the following beneficiation process is used for mineral $Al_2O_3.2H_2O$
1) Froath flotation 2) leaching 3) Liquation 4) Magnetic seperation

5) The metal that can't be obtained by electrolysis of an aqeous solution of its salt is
1) Cu 2) Cr 3) Ag 4) Ca

6) Which of the oxide groups among following can't be reduced by carbon
1) Fe_2O_3 ,Zno 2) Pbo, Fe_2O_4 3) Cu_2O , SnO_2 4) CaO, k_2O

7) Which of the following metal is not extracted by leaching
1) Al 2) Hg 3) Ag 4) Au

8) Which of the following pairs of metals is purified by VanArkel method
1) Ga & In 2) Ag & Au 3) Zr & Ti 4) Ni & Fe

9) With respect to are Ellingham diagram helps to predict the feasibility of it's
1) Zone refining 2) Thermal reduction 3) Electrolysis 4) Vapour phase refining

10) Which of the following factor is of no significant for roasting sulphide ores to the oxides and not subject the Sulphide Ores to Carbon reduction directly?
1) CO_2 is more volatile than CS_2
2) Metal sulphides are thermodynamically more stable than CS_2
3) CO_2 is thermodynamically more stable than CS_2
4) Metal sulphides are less stable than the corresponding oxides

11) The Correct statement is
1) Zone refining process is used for the refining of titanium 2) Zincite is a Carbon Ore
3) aniline is a froath stabilizer 4) Sodium cyanide can't be used in the metallurgy of Ag

12) Match the following

A) Sulphide ore	1) Silver
B) Mond's process	2) Iron
C) Cupellation	3) Carbonate Ore
D) Calcination	4) Froath flotation
E) Pyrometallurgy	5) Nickel

A, B, C, D, E	A, B, C, D, E	A, B, C, D, E	A, B, C, D, E
1) 4, 5, 1, 3 ,2	2) 4, 5, 2, 3, 1	3) 1, 2, 3, 4, 5	4) 5 ,4, 3, 2, 1

13) Match the following

A) Mond's process	1) Purification of Cu
B) VanArkcl Method	2) Purification of Zn
C) Cupellation	3) Purification of Ni
D) Distillation	4) Purification of Titanium

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

14) From the fallowing number of oxide ores is Carnalite, Bauxite, Magnetite, Pyroleusite, Haematite, Cuprite, Galena, Cassiterite----------

15) In the manufacture of iron from Haematite ore lime stone is added to acts as---
1) flux 2) slag 3) a reducing agent 4) an oxidising agent

16) Which of the following process involves smelting?
1) $ZnCO_3 \rightarrow ZnO + CO_2$ 2) $PbS + 3O_2 \rightarrow PbO + 2SO_2$
3) $Al_2O_3.2H_2O \rightarrow Al_2O_3 + 2H_2O$ 4) $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

17) Liquation, Poling, Calcination, Leaching, Cupellation, Zone refining, Levigation, Roasting.
How many of the following are refining methods……

18) From the Ellingham graphs on Carbon which of the following statement is false
1) CO_2 is more stable than CO at less than 983K 2) CO reduces Fe_2O_3 to Fe at less than 983K
3) CO is less stable than CO_2 at more than 983K
4) CO reduces Fe_2O_3 to Fe in the reduction zone of blast furnace

19) When a metal 'M' is treated with NaOH a white gelatinous precipitate 'X' is obtained which is soluble in excess of NaOH compound 'X' when heated strongly gives an oxide. Which is used in chromatography as an adsorbent. The metal 'M' is
1) Ca 2) Al 3) Fe 4) Zn

20) The method of zone refining of metal is based upon the Principe is ….
1) greater solubility of the impurity in molten state than in solid
2) greater mobility of pure metal than impurity
3) higher melting point of impurity than of pure metal
4) greater nobel character of solid metal than that of the impurity

21) Consider the following statements Roasting is carried out to
1) Convert sulphide into oxide 2) Melt the ore
3) Remove moisture water of hydration and expel organic matter
4) Remove sulphur and arsenic in the form of volatile oxide.
A) 1,3,4 are correct B) 1,2,3 are correct C) 2,3,4 are correct D) 1,2,4 are correct

22) Poling process is Used
1) for removal of Cu_2O from Cu 2) For the removal of Al_2O_3 from Al
3) For the removal of Fe_2O_3 4) In all the above

23) Ore dressing for iron is done by
1) Froath flotation 2) Magnetic separation 3) Leaching 4) All of these

24) The incorrect statement is
1) Calamine and siderite are carbonates 2) Argentite and cuprite are carbonates
3) Zinc blende and Iron pyrities are sulphides 4) Malachite azurite are ores of copper

25) Cassiterite is an ore of
1) Mn 2) Ni 3) Sb 4) Sn

26) Pyroleusite is an
1) oxide ore 2) sulphide ore 3) carbide ore 4) not an ore

27) Which one of the following does not occur as sulphide ore?
1) Zn 2) Cr 3) Ag 4) Fe

28) Assertions & reason type
A: All minerals are ore
R: Ores are minerals from which metal can be extracted conveniently and economically
1) A & R are correct R is explanation of A 2) A & R correct R not explanation of A
3) If A is correct & R is wrong 4) If A is incorrect R is correct

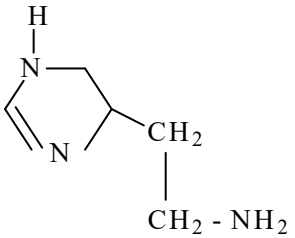
29) Iron is….th most abundant element in the earth crust

30) What is the oxidation state of Iron in Haematite are--------

CHEMISTRY IN EVERYDAY LIFE

01 Drugs which do not bind to the enzyme's active site, but to different site. The different site is called:
1) Inhibition site 2) Competitive site 3) Allosteric site 4) None of these

02 The drug



is used as
1) Antacid 2) Analgesic 3) Antimicrobial 4) Antiseptic

03 Arsenic drugs are mainly used in the treatment of
1) Jaundice 2) Typhoid 3) Syphilis 4) Cholera

04 Which of the following substances cannot be used as a fixative in perfumes
1) Benzoin 2) Sandal wood 3) Ghlyceryl dinitrate 4)Glyceryl diacetate

05 Commonly used antiseptic "Dettol" is a mixture of
1) O-chlorophenozylenol+terpeneol 2) O-cresol+terpencol
3) Phenol+terpeneol 4) Chloroxylenol+terpencol

06 Benzalikonium chloride is a
1) Cationic surfactant and antiseptic 2) Anionic surfactant and soluble in most of organic
3) Cationic surfactant and insoluble in most of organic solvents 4) Cationic surfactant and antimalarial

07 Amoxicillin is semi-synthetic modification of
1) Penicillin 2) Streptomycin 3) Tetracycline 4) Chloramphenicol

08 Barbituric acid is used as
1) An antipyretic 2) An antiseptic 3) A tranquilizer 4) An analgesic

09 Antibiotics that are effective mainly against gram-positive or gram negative bacteria X antibiotics that are effective against single organism or disease are Y. What is X and Y
1) X= Broad spectrum antibiotics Y=Narrow spectrum
2) X=Broad spectrum antibiotics Y=Limited spectrum
3) X=Narrow spectrum antibiotics Y=Limited spectrum
4) X=Narrow spectrum antibiotics Y=Broad spectrum

10 What amount of water is added to 100 ml 1% aqueous solution of phenol used as antiseptic
1) 400 ml 2) 108 ml 3) 500 ml 4) 100 ml

11 The anesthetic drug which is administered by injection is
1) Diethyl ether 2) Divinyl ether 3) Liquid nitrous oxide 4) Propofol

12 Which of the following analgesic is not habit forming
1) Morphine 2) Aspirin 3) Codein 4) Heroin

13 How many of the following compounds are neurotransisters (Chemical messengers)
I) Noradrenaline II) Dopamine III) Serotonin IV) Adrenaline V) Aspirin
1) I,II 2) II,III 3) II,III,IV 4) I,II,III

14 Most of the deodorants contain aluminum salts because they
1) Act as antiperspirants 2) Act as antibacterial agents
3) Mask body odour 4)Act as antiseptics

15 Chemical substances used by insects for communication are called
1) Pheromones 2) Hormones 3) Enzymes 4) Nucleo proteins

16 Antiseptics and disinfectants either kills or prevent growth of microorganisms. Identify which of the following statements is not true.
1) Chlorine and iodine are used as strong disinfectants
2) Dilute solutions of Boric acid and Hydrogen peroxide are strong antiseptics
3) Disinfectants harm the living tissues
4) A 0.2% solution of phenol is antiseptic while 1% solution acts as a disinfectant.

17 An antibiotic with a broad spectrum
1) Kill the antibodies 2) Acts on a specific antigen
3) Acts on different antigens 4) Acts on both the antigens and antibodies

18 Which of the following is a local anesthetic
1) Diazepam 2) Procaine 3) Mescaline 4) Chloroform

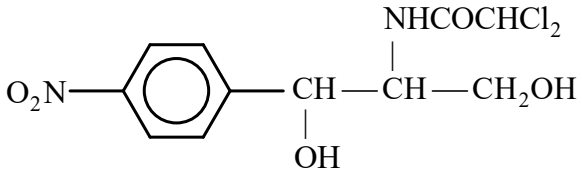
19 Which of the following is used as an antibiotic
1) Ciprofloxacin 2) Paracetamol 3) Ibuprofen 4) Tocophenol

20 Which of the following can possible be used as analgesic without causing addiction and any modification
1) Morphine 2) N-acetyl paraaminophenol 3) Diazepam 4) Tetra hydrocatenol

21 Which of the following compounds are not used as disinfectants
A) Chloroxylenol B) Bithinol C) Veronal D) Prontosil
1) A,B 2) C,D 3) B,D,E 4) A,B,E

22 Which of the following release to create disease like common cold, acidity, swelling, redness of skin and itching.
1) Virus 2) Bacteria 3) Histamine 4) Worn

23 Whose structure of this ?



1) Chlorozylanol 2) Chloranphenicol 3) Penicillin-F 4) Ampicillin

24 LSD (Lysergic acid diethylamide) is
1) Sweetening agent 2) Synthetic fibre 3) Psychedelic drug 4) Antibiotic

25 Ibuprofen contains(active form)
1) Only S-enantiomer active 2) Only R-enantiomer active
3) Racemic mixture of both R and S enantiomer 4) Both R and S enantiomer are active pain killer

26 Which of the following compounds is used as body deodorant
1) Aspirin 2) Omeprazole 3) Indigosol-O 4) P-Chlorometaxylenol

27 The pair whose both species are used in antacid medicinal preparation is
1) $NaHCO_3$ *and* $Mg(OH)_2$ 2) Na_2CO_3 *and* $Ca(HCO_3)_2$
3) $Ca(HCO_3)_2$ *and* $Mg(OH)_2$ 4) $Ca(OH)_2$ *and* $NaHCO_3$

28 The drug taganet is
1) Analgesic 2) Antidepressant 3) Antibiotics 4) Antacid

29 Which of the following drug is analgesic
1) Chloroxylenol 2) Phenacetin 3) Diclofenac 4) Bithinal

30 Which of the following is used for killing snails and bugs
1) Snarol 2) Chloroform 3) Aspirin 4) H_2O_2

POLYMERS

(1) The condensation polymer among the following is
(a) protein (b) PVC (c) polythene (d) Rubber

(2) The polymer of natural rubber is
(a) All trans isoprene (b) All cis isoprene (c) All optical isoprene (d) None of these

(3) The repeating unit present in Nylon-6 is
(a) $-CO-NH-(CH_2)_6-$ (b) $-CO-(CH_2)_6-NH_2-$
(c) $-CO-(CH_2)_5-NH$ (d) $-CO-(CH_2)_4-NH-$

(4) The species which can serve as an initior for the cationic polymerisation is
(a) HNO_3 (b) $LiAlH_4$ (c) $NaBH_4$ (d) $AlCl_3$

(5) Which of the following is a linear polymers?
(a) Bakelite (b) Glycogen (c) PVC (d) LDP

(6) Which of the following is not true for thermo plastic polymers
(a) Thermo plastic are linear polymers (b) The soft and melt on heating
(c) Molten polymer can be remoulded into any shape
(d) They have cross-linkages which break on heating

(7) Match the column I with column II and mark the appropriate choice

Column I	Column II
A. PVC	(i) Rubber
B. Condensation polymer	(ii) Thermo plastic
C. Polysacharide	(iii) Decron
D. Elastomer	(iv) Natural polymer

(a) A – (ii) , B- (iii), C- (iv) , D- (i) (b) A – (i) , B- (ii), C- (iv) , D- (iii)
(c) A – (iii) , B- (iv), C- (i) , D- (ii) (d) A – (iv) , B- (i), C- (iii) , D- (ii)

(8) Which of the following is not preparation by addition polymerization
(a) Polythene (b) Polystyrene (c) Neoprene (d) Nylon – 6,6

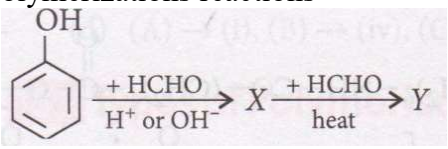
(9) Teflon and Neoprene are the examples of
(a) Co polymers (b) monomers (c) homo polymers (d) condensation polymers

(10) Which of the following is not true about high density polythene
(a) Tough (b) Hard (c) Inert (d) Highly branched

(11) Terylene is a condensation polymers of ethylene glycol and
(a) benzoic acid (b) phthalic acid (c) Terephthalic acid (d) Salicyclic acid

(12) Novolac on heating with formaldehyde undergoes ---- to form an infusible solid mass called ----------
(a) Polymerisation , melamine (b) Vulcanisation,resins
(c) Cross- linking, Bakelite (d) Condensation, polystyrene

(13) Identify X and Y in the given polymerizations reactions



(a) X= Bakelite, Y=Novolac (b) X= Novolac, Y=Melamine
(c) X= Bakelite, Y= Melamine (d) X= Novolac, Y= Bakelite

(14) In Vulcanisation of rubber
(a) Sulphur reacts to form a new compound (b) Sulphur cross- links are introduced
(c) Sulphur forms a very thin protective layer over rubber (d) All statements are correct

(15) Which of the following statements is wrong
(a) PVC stands for polyvinyl chloride (b) PTFE stands for Teflon
(c) PMMA stands for polymethyl acrylate (d) Buna-S stands for natural rubber

(16) If $N_1, N_2, N_3 - - - - - Ni$ are the numbers of molecules with molecular masses $M_1, M_2, M_3 - - - - - Mi$ respectively. Then the number average molecular mass $(\overline{M_n})$ is

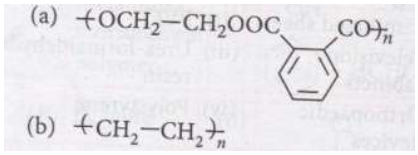
(a) $\sum \frac{NiMi^2}{NiMi}$ (b) $\sum \frac{NiMi}{Ni}$ (c) $\sum \frac{Mi^2}{Ni}$ (d) $\sum \frac{NiMi}{Mi}$

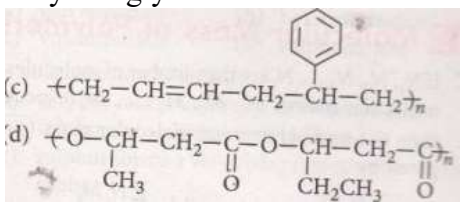
(17) Poly dispersity index (PDI) is
(a) $\frac{\overline{M_w}}{\overline{M_n}}$ (b) $\frac{\overline{M_n}}{\overline{M_w}}$ (c) $\overline{M_n} \times \overline{M_w}$ (d) $\overline{M_w} - \overline{M_n}$

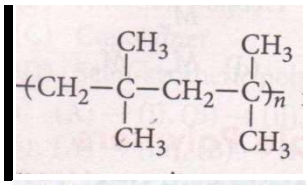
(18) Which of the following is / are a biodegradable synthetic polymers
(a) Aliphatic polyesters (b) PHBV (c) $Nylon-2-Nylon-6$ (d) All of these

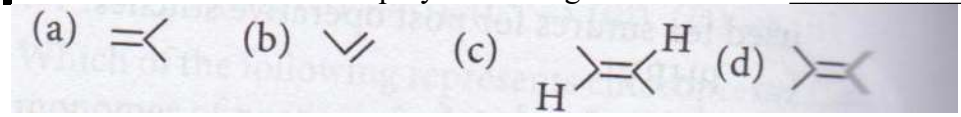
(19) Which of the following is not a semi- synthetic polymer
(a) Cis- polyisoprene (b) Cellulose nitrate (c) Cellulose acetate (d) Vulcanised rubber

(20) In which of the following polymers ethylene glycol is one of the monomer units?





(21)  is a polymer having monomer units _____



(22) Among cellulose , polyvinyl chloride, nylon and natural rubber, The polymer in which the inner molecular force of attraction is weakest is
(a) Nylon (b) Polyvinyl chloride (c) cellulose (d) Natural rubber

(23) Assertion : Decron is formed by step growth polymerization of monomer units
Reason : Decron fibre is crease resistant
(a) If both assertion and reason are true and reason is correct explanation of assertion

(b) If both assertion and reason are true and reason is not correct explanation of assertion
(c) Assertion is true but reason is false (d) If both assertion and reason are false

(24) On complete hydrogenation, natural rubber produces
(a) *ethylene – propylene* copolymer (b) vulconised rubber (c) polypropylene (d) polybutylene

(25) The chemical name for melamine is
(a) 1,3,5 – triamino -2,4,6 – triazine (b) 2,4,6 – triamino -1,3,5 – triazine
(c) 2- amino – 1,3,5- triazine (d) 2,4 – diamino -1,3,5 – triazine

(26) Which is not classified as thermo plastics
(a) polyethylene (b) polystyrene (c) Bakelite (d) Neoprene

(27) Arrange the following monomers in order of decreasing ability to undergo cationic polymerization
(1) $CH_2 = CH - C_6H_4(NO_2)$ (2) $CH_2 = CH - C_6H_4(CH_3)$ (3) $CH_2 = CH - C_6H_4(OCH_3)$
(a) 1>2>3 (b) 2>1>3 (c) 3>2>1 (d) 1>3>2

(28) Which of the following is not a condensation polymer
(a) Melamine (b) Glyptal (c) Decron (d) Neoprene

(29) The number of condensation polymers among the following is
Nylon – 6,6 , Teflon , Decron, polyacrylonitrite, PMMA, Bakelite

(30) The number of copolymers among the following is ---------
PAN, Buna-S, Neoprene, Melmac, polybutadiene, *Nylon* – 6 , *Nylon* – 6,6 , Alkyd- resin

SERIES & SEQUENCE -KEY										
1-10	**2**	**3**	**3**	**3**	**3**	**4**	**1**	**4**	**3**	**2**
11-20	**3**	**1**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
21-30	**50**	**8**	**3**	**12**	**5**	**10**	**25**	**5**	**1**	**1**

FUNCTIONS										
1-10	**1**	**2**	**2**	**1**	**3**	**2**	**1**	**1**	**4**	**2**
11-20	**2**	**2**	**2**	**3**	**2**	**1**	**1**	**1**	**3**	**1**
21-30	**1**	**3**	**3**	**1**	**4**	**1**	**2**	**1**	**1**	**2**

MOTION IN A STRAIGHT LINE										
1-10	**C**	**A**	**D**	**A**	**B**	**B**	**D**	**D**	**A**	**A**
11-20	**D**	**C**	**A**	**B**	**D**	**C**	**C**	**B**	**C**	**B**
21-30	**D**	**D**	**A**	**B**	**C**	**C**	**B**	**D**	**A**	**A**

MOTION IN A PLANE										
1-10	2	3	3	2	2	2	1	1	4	2
11-20	1	2	2	1	1	3	3	3	4	2
21-30	6	20	800	3	50	2	1	3	2	2

TOPIC : NEWTON'S LAWS OF MOTION										
1-10	A	C	B	D	A	B	C	B	C	B
11-20	A	D	C	A	B	C	B	A	A	D
21-30	C	A	C	B	B	B	C	A	D	B

TOPIC: METALLURGY										
1-10	2	2	4	2	4	4	2	3	2	1
11-20	3	1	3	6	1	4	4	3	2	1
21-30	1	1	2	2	4	1	2	4	4	3

CHEMISTRY IN EVERYDAY LIFE										
01-10	**2**	**1**	**3**	**3**	**4**	**1**	**1**	**3**	**3**	**1**
11-20	**4**	**2**	**3**	**2**	**1**	**2**	**3**	**2**	**1**	**3**
21-30	**2**	**3**	**2**	**3**	**1**	**4**	**1**	**4**	**3**	**1**

POLYMERS										
1-10	a	b	c	d	c	d	a	d	c	d
11-20	c	c	d	b	d	b	a	d	a	a
21-30	a	d	b	a	b	c	c	d	3	4