ADITYA JUNIOR COLLEGES

KAKINADA - RAJAMAHENDRAVARAM - BHIMAVARAM - AMALAPURAM - PALAKOL
TADEPALLIGUDEM - MANDAPETA - NARASAPURAM - VISAKHAPATNAM - SRIKAKULAM

EAMCET						DT : 01-07-2023
Time : 3 Hours		JR_ARIJE_EAPCET_WK-1				Max.Marks : 160
S.No	SECTION	TYPE OF QUESTIONS	No.of Questions	(+VE) MARKS	(-VE) MARKS	EACH SECTION MARKS
1	I	SINGLE ANSWER	160	1	0	160
Total Questions			160	Total Marks		160

MATHEMATICS

1 If $2^3+4^3+6^3+\ldots..+(2n)^3=kn^2(n+1)^2$ then $k=$

1) $\frac{1}{2}$ **2)** 1 **3)** $\frac{3}{2}$ **4)** 2

2 Mathematical induction is the principle containing the set

1) R **2)** N **3)** Q **4)** Z

3 $\forall n\in N, \frac{n^4}{24}+\frac{n^3}{4}+\frac{11n^2}{24}+\frac{n}{4}$, is a

1) Rational number **2)** Integer
3) Natural number **4)** Real number

4 $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\ldots..(n-3)$ terms.

1) $\frac{n}{n+2}$ **2)** $\frac{n+1}{n(n+5)}$
3) $\frac{n-3}{2n-5}$ **4)** $\frac{n-1}{n(2n-3)}$

5 $1^3-2^3+3^3-4^3+\ldots..+9^3=$

1) 425 **2)** -425 **3)** 475 **4)** -475

6 $2+3+5+6+8+9+\ldots 2n$ terms=

1) $4n^2$ **2)** $3n^2+2n$ **3)** $4n^2+2n$ **4)** $5n^2+2n$

7 The n^{th} term of the series $3+7+13+21+\ldots.$ is

1) $4n-1$ **2)** n^2+2n **3)** n^2+n+1 **4)** n^2+2

8 $\frac{1}{4.7}+\frac{1}{7.10}+\frac{1}{10.13}+\ldots..$ up to n terms=

1) $\frac{n}{4(4n+3)}$ **2)** $\frac{n}{4(6n+1)}$
3) $\frac{n}{4(3n+4)}$ **4)** $\frac{n}{4(3n-4)}$

9 If $a_k=\frac{1}{k(k+1)}$ for $k=1,2,3,\ldots n$ then $\left(\sum_{k=1}^{n}a_k\right)^2=$

1) $\frac{n}{n+1}$ **2)** $\frac{n^2}{(n+1)^2}$
3) $\frac{n^4}{(n+1)^4}$ **4)** $\frac{n^6}{(n+1)^6}$

10 Sum of n^{th} bracket of $(1)+(2+3+4)+(5+6+7+8+9)+\ldots..$ is

1) $(n-1)^3+n^3$ **2)** $(n-1)^3+8n^2$

3) $\frac{(n+1)(n+2)}{6}$ **4)** $\frac{(n+3)(n+2)}{12}$

11 $(\sum n^3)(\sum n) = (\sum n^2)$ if

1) $n=3$ **2)** $n=1$ **3)** $n^2=3$ **4)** $n=-1$

12 $\sum_{k=1}^{5} \frac{1^3+2^3+3^3+.....+k^3}{(1+3+5+.....+2k-1)} =$

1) 32.5 **2)** 28.5 **3)** 24.5 **4)** 22.5

13 If the sum to n terms of an A.P. is $\frac{4n^2-3n}{4}$, then the n^{th} term of the A.P is

1) $\frac{7n-8}{4}$ **2)** $\frac{3n^2-2}{4}$

3) $\frac{8n-7}{4}$ **4)** $\frac{5n-1}{4}$

14 If $t_n = \frac{1}{4}(n+2)(n+3)$ for $n = 1, 2, 3, \ldots.$ then $\frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3} + \ldots. + \frac{1}{t_{2021}} =$

1) $\frac{2021}{6072}$ **2)** $\frac{2021}{1518}$

3) $\frac{8084}{2024}$ **4)** $\frac{8084}{2021}$

15 The sum of first n terms of the series $\frac{3}{2} + \frac{5}{4} + \frac{9}{8} + \frac{17}{16} + \ldots..$

1) $n-1+2^{-n}$ **2)** $n+1+2^{-n}$ **3)** $n+1-2^{-n}$ **4)** $n-1-2^{-n}$

16 If $S_1 = \{2\}, S_2 = \{3, 6\}, S_3 = \{4, 8, 16\}, S_4 = \{5, 10, 20, 40\}$ then the sum of numbers in the set S_{15} is

1) $5(2^{15})$ **2)** $16(2^{16}-1)$ **3)** $15(2^{15}-1)$ **4)** $16(2^{15}-1)$

17 The sum of the series $S = 1^2 - 2^2 + 3^2 - 4^2 + \ldots.. + 2001^2 - 2002^2 + 2003^2$ is

1) 20055006 **2)** 2007006 **3)** 1005004 **4)** 2006007

18 If sum of the first 40 terms of the series $3 + 4 + 8 + 9 + 13 + 14 + \ldots.. = (102)m$ then $m =$

1) 20 **2)** 40 **3)** 60 **4)** 30

19 The value of $1^2 + 3^2 + 5^2 + \ldots.. + 25^2 =$

1) 1729 **2)** 1469 **3)** 2925 **4)** 1456

20 The sum of the series $\frac{3}{1^2} + \frac{5}{1^2+2^2} + \frac{7}{1^2+2^2+3^2} + \ldots...$ up to 11 terms=

1) $\frac{7}{2}$ **2)** $\frac{60}{11}$

3) $\frac{11}{4}$ **4)** $\frac{11}{2}$

21 For every natural number $n, n(n+1)$ is always

1) even **2)** odd **3)** multiple of 3 **4)** multiple of 4

22 $\sum_{k=1}^{20}(1+2+3+\ldots.+k) =$

1) 1450 **2)** 1540 **3)** 1650 **4)** 1560

23 $1 + \frac{1}{2}(1+2) + \frac{1}{3}(1+2+3) + \ldots..$upto 20 terms=

1) 225 **2)** 115 **3)** 255 **4)** 511

24 If a, b and n are natural numbers then $a^{2n-1}+b^{2n-1}$ is divisible by

1) $a+b$ **2)** $a-b$ **3)** a^2+b^2 **4)** a^3+b^3

25 $\forall n \in N, 7^{2n}+3^{n-1}.2^{3n-3}$ is divisible by

1) 50 **2)** 25 **3)** 2550 **4)** 2425

26 Sum of the cubes of three successive natural numbers is divisible by

1) 99 **2)** 54 **3)** 9 **4)** 27

27 The greatest positive integer v which divides $n(n+1)(n+2)....(n+r-1), \forall n \in N$ is

1) $(r+1)!$ **2)** $r!$ **3)** $n+r$ **4)** $n+r-1$

28 If $10^n+3.4^n+x$ is divisible by 9 for all $n \in N$, then least positive value of x is

1) 14 **2)** 1 **3)** 5 **4)** 23

29 $\forall n \in N, 3^{2n}+7$, is divisible by

1) 64 **2)** 24 **3)** 16 **4)** 8

30 $\forall n \in N, (1+x)^n-nx-1$ is divisible by

1) $2x$ **2)** $2x^3$ **3)** x^2 **4)** $2x^2$

31 $\frac{(n+2)!}{(n-1)!}$ is divisible by

1) 11 **2)** 6 **3)** 36 **4)** 24

32 Let $p(n): 1+\frac{1}{4}+\frac{1}{9}+.....+\frac{1}{n^2}<2-\frac{1}{n}$ is true for

1) $\forall n \in N$ **2)** $n=1$

3) $n>1, \forall n \in N$ **4)** $n>2$

33 $(n!)^2>n^n$ is true for

1) $\forall n \in N$ **2)** $\forall n>1, n \in N$

3) $\forall n>2, n \in N$ **4)** $\forall n \in Z$

34 If $n \in N$ then $1+\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{3}}+....+\frac{1}{\sqrt{n}}$

1) $\geq \sqrt{n}$ **2)** $=\sqrt{n}$

3) $\leq \sqrt{n}$ **4)** 1

35 If $\left(1+\frac{3}{1}\right)\left(1+\frac{5}{4}\right)\left(1+\frac{7}{9}\right)....\left(1+\frac{2n+1}{n^2}\right)=121$, then $n=$

1) 11 **2)** 10 **3)** 9 **4)** 8

36 The statement n^5-5n^3+4n is divisible by 120 is true for

1) $n=1$ only **2)** $n=10$ only

3) $n=100$ only **4)** all positive integer values of n

37 For any natural number $n, (15\times 5^{2n})+(2\times 2^{3n})$ is divisible by

1) 7 **2)** 11 **3)** 13 **4)** 17

38 If $1^4+2^4+3^4+....+n^4=f(n)(1^2+2^2+3^2+....+n^2), \forall n \in N$, then $f(4)$ is equal to

1) $\frac{58}{5}$ **2)** $\frac{57}{5}$ **3)** $\frac{59}{5}$ **4)** $\frac{56}{5}$

39 For all $n \in N, (n+24)(n+25)(n+26)(n+27)$ is divisible by

1) 24 **2)** 26 **3)** 27 **4)** 29

40 $n \in N$ then, the statement $8n + 16 \leq 2^n$ is true for

1) $n = 2$ **2)** $n = 3$ **3)** $n = 6$ **4)** $n = 5$

41 The locus of the point which is at a distance 5 unit from $x-$ axis is

1) $y^2 + 25 = 0$ **2)** $y^2 - 25 = 0$ **3)** $y + 25 = 0$ **4)** $y - 25 = 0$

42 The locus of the point for which the sum of the squares of distance from the coordinate axes is 25 is

1) $x^2 + y^2 = 25$ **2)** $x^2 + y^2 = 19$ **3)** $x^2 + y^2 = 32$ **4)** $x^2 + y^2 = 29$

43 If $A(a, 0), B(-a, 0)$ are two points. The locus of the point C if $\angle ACB = 90^0$ is

1) $x^2 - y^2 = a^2$ **2)** $a(x^2 + y^2) = 0$ **3)** $x^2 + y^2 = 2a^2$ **4)** $x^2 + y^2 = a^2$

44 $A(0, 4)B(0, -4)$ are two points. The locus of P which moves such that $PA - PB = 6$ is

1) $9x^2 - 7y^2 + 63 = 0$ **2)** $9x^2 + 7y^2 - 63 = 0$

3) $9x^2 + 7y^2 + 63 = 0$ **4)** $9x^2 - 7y^2 - 63 = 0$

45 If the point (5, 7) is transformed to (-1, 2) when the origin is shifted to A, then $A =$

1) (4, 9) **2)** (6, 5) **3)** (-6, -5) **4)** (2, 4)

46 If the axes are rotated through an angle 30^0 in the clockwise direction, the point $(4, 2\sqrt{3})$ in the new system is

1) $(2, 3)$ **2)** $(2, \sqrt{3})$ **3)** $(\sqrt{3}, 2)$ **4)** $(\sqrt{3}, 5)$

47 If the axes are translated to the point (-2, -3) then the equation $x^3 + 3y^2 + 4x + 18y + 30 = 0$ transforms to

1) $x^2 + y^2 = 4$ **2)** $x^2 + 3y^2 = 1$ **3)** $x^2 - y^2 = 4$ **4)** $x^2 - 3y^2 = 1$

48 In order to make the first degree terms missing in the equation $2x^2 + 7y^2 + 8x - 14y + 15 = 0$, the origin should be shifted to the point

1) (1, -2) **2)** (-2, -1) **3)** (2, 1) **4)** (-2, 1)

49 By translating the axis the equation $xy - 2x - 3y - 4 = 0$ has changed to $xy = k$ then $k =$

1) -10 **2)** 10 **3)** 4 **4)** -4

50 The transformed equation of $x\cos\theta + y\sin\theta = p$ when the axes are rotated through an angle θ.

1) $x = p$ **2)** $y = p$ **3)** $x + y = p$ **4)** $x - y = p$

51 Locus of the centroid of a triangle whose vertices are (1, 0) $(a\cos t, a\sin t)(b\sin t, -b\cos t)$is $9x^2 + 9y^2 - 6x = k$ then $k =$

1) $a^2 + b^2$ **2)** $a^2 + b^2 - 1$ **3)** $a^2 + b^2 + 1$ **4)** 0

52 If the axes are rotated through an angle 45^0 then the coordinates of the point $\left(4\sqrt{2}, -6\sqrt{2}\right)$ in the new system are. . . . .

1) (-10, -2) **2)** (-2, -10) **3)** (10, 10) **4)** (-2, 10)

53 The locus of the point whose ratio of distance from the origin to its distance from (-2, -3) is 5 : 7 is given by

1) $24\left(x^2 + y^2\right) - 100x - 150y - 325 = 0$ **2)** $24\left(x^2 + y^2\right) + 100x + 150y - 325 = 0$

3) $24\left(x^2+y^2\right)-100x+150y+325=0$ **4)** $2x^2+2y^2=325$

54 The ratio in which the point P whose abscissa is 3 divides the join of A(6, 5) and B(-1, 4) is equal to

1) 2 : 3 **2)** 3 : 2 **3)** 4 : 3 **4)** 3 : 4

55 When the origin is shifted to (2, 3) the transformed equation $x^2+3xy-2y^2+17x-7y-11=0$ then the origin equation of the curve is

1) $x^2-2y^2-3xy+4x-y+20=0$ **2)** $x^2-2y^2-3xy-4x-y+20=0$

3) $x^2-2y^2+3xy+4x-y-20=0$ **4)** $x^2-2y^2-3xy+4x-y-20=0$

56 The locus represented by $x=\frac{a}{2}\left(t+\frac{1}{t}\right), y=\frac{a}{2}\left(t-\frac{1}{t}\right)$ is

1) $x^2+y^2=a^2$ **2)** $x^2-y^2=a^2$ **3)** $2x^2-y^2=a^2$ **4)** $x^2-2y^2=a^2$

57 If the origin is shifted to (2, 3) and the axes are rotated through an angle 45^0 about that point then the transformed equation of $2x^2+2y^2-8x-12y+18=0$ is

1) $x^2-7y^2-14xy-2=0$ **2)** $x^2+y^2=4$

3) $x^2-y^2=4$ **4)** $8x^2-2y^2=9$

58 A straight line meets the x and y axes at the points A, B respectively if $AB=6$ units then the locus of the point P which divides the line segment AB such that AP : PB=2 : 1 is

1) $3x^2+y^2=36$ **2)** $4x^2+y^2=36$ **3)** $3x^2+y^2=16$ **4)** $4x^2+y^2=16$

59 Let A(2, 3), B(3, -6), C(5, -7) be three points if P is a point satisfying the condition $PA^2+PB^2=2PC^2$ then a point that lies on the locus of P is

1) (2, -5) **2)** (-2, 5) **3)** (13, 10) **4)** (-13, -10)

60 The equation to the locus of a point P for which the distance from P to (-4, 0) is double the distance from P to x-axis

1) $x^2+3y^2+8x+16=0$ **2)** $x^2+3y^2-8x+16=0$

3) $x^2-3y^2+8x-16=0$ **4)** $x^2-3y^2+8x+16=0$

61 The locus of the point equidistant from the points $(a+b,a-b)$ and $(a-b,a+b)$ is

1) $bx-ay=0$ **2)** $bx+ay=0$ **3)** $ax-by=0$ **4)** $x-y=0$

62 If $A=(a\cos q, b\sin q)$, $B=(-a\sin q, b\cos q), O$ is the origin q is a parameter, then the locus of centriod of ΔAOB is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=$

1) 2/9 **2)** 1/9 **3)** 9/2 **4)** 1

63 A straight line segment AB of length a moves with its ends of on the axes. The locus of the point P which divides the segment in the ratio 1 : 2 is

1) $9x^2+4y^2=a^2$ **2)** $9(x^2+4y^2)=4a^2$

3) $9(x^2+4y^2)=8a^2$ **4)** $9x^2+9y^2=4a^2$

64 $A=(2,5), B=(4,-11)$, and the locus of C is $9x+7y+4=0$ then the locus of the centroid of ABC is

1) $27x+21y-8=0$ **2)** $3x+4y-2=0$ **3)** $24x+22y-6=0$ **4)** $5x+3y-7=0$

65 The line joining two points $A(2,0)$ and $B(3,1)$ is rotated about A in anticlockwise direction through an angle 15^0 . If B goes to $C, C =$

1) $\left(\frac{4+\sqrt{2}}{2}, \sqrt{6}\right)$ **2)** $\left(\frac{6+\sqrt{2}}{2}, \frac{\sqrt{6}}{2}\right)$

3) $\left(\frac{2+\sqrt{2}}{2}, \frac{\sqrt{6}}{2}\right)$ **4)** $\left(\frac{4+\sqrt{2}}{2}, \frac{\sqrt{6}}{2}\right)$

66 The angle of rotation of axes in order to eliminate xy term in the equation $xy = C^2$ is

1) $\frac{\pi}{12}$ **2)** $\frac{\pi}{6}$

3) $\frac{\pi}{3}$ **4)** $\frac{\pi}{4}$

67 If the equation of locus of the point equidistant from the points (a_1, b_1) and (a_2, b_2) is $(a_1 - a_2)x + (b_1 - b_2)y + c = 0$ then

1) $a_1^2 - a_2^2 + b_1^2 - b_2^2$ **2)** $\frac{1}{2}(a_1^2 + a_2^2 + b_1^2 + b_2^2)$

3) $\sqrt{a_1^2 + b_1^2 - a_2^2 - b_2^2}$ **4)** $\frac{1}{2}(a_2^2 + b_2^2 - a_1^2 - b_1^2)$

68 The base of a triangle lies along $x = a$ and is of length 'a'. The area of triangle is a^2 . The locus of vertex is

1) $(x + a)(x - 3a) = 0$ **2)** $(x - a)(x + 3a) = 0$

3) $(x + a)(x + 2a) = 0$ **4)** $(x + 2a)(x - a) = 0$

69 The angle of rotation of the axes so that the equation $\sqrt{3}x - y + 5 = 0$ may be reduced to the form $y = k$ where k is constant is

1) $\frac{\pi}{6}$ **2)** $\frac{\pi}{4}$

3) $\frac{\pi}{3}$ **4)** $\frac{\pi}{12}$

70 The transformed equation of $4xy - 3x^2 = 10$ when the axes are rotated through an angle whose tangent is 2 is

1) $x^2 - 4y^2 = 10$ **2)** $4x^2 - y^2 = 10$

3) $xy - 10 = 0$ **4)** $2x^2 - y^2 + 10 = 0$

71 The coordinate axes are rotated about the origin O in the counter clockwise direction through an angle 60^0. If a and b are the intercepts made on the new axes by a straight line whose equation referred to the original axes is $3x + 4y - 5 = 0$ then $\frac{1}{a^2} + \frac{1}{b^2} =$

1) $\frac{1}{25}$ **2)** $\frac{1}{9}$ **3)** $\frac{1}{16}$ **4)** 1

72 The line passing through (7, 3) (5, 1) meets the x-axis at P . If the line is rotated through an angle 30^0 in the anti clock wise direction about P then the slope of its new position is

1) $\sqrt{3}$ **2)** $\frac{1}{\sqrt{3}}$

3) $2 + \sqrt{3}$ **4)** $2 - \sqrt{3}$

73 If the distance between the two given points is 2 units and the points are transferred by shifting the origin to (2, 2) then the distance between the points in their new position is

1) 2 **2)** 5 **3)** 6 **4)** 7

74 The point (4, 1) undergoes the following three transformation successively
i) Reflection about the line $y = x$
ii) Transformation through a distance of 2 units along the +ve direction of the x-axis
iii) Rotation through an angle $\frac{\pi}{4}$ about the origin in the antilock wise direction. The final position of the point is given by the coordinates

1) $\left(\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$ **2)** $\left(-2, 7\sqrt{2}\right)$

3) $\left(\frac{7}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ **4)** $(7, 1)$

75 The transformed equation of $x^2 + 2\sqrt{3}xy - y^2 - 8 = 0$ when the axes are rotated through an angle $\frac{\pi}{6}$ is

1) $x^2 - y^2 = 0$ **2)** $x^2 - y^2 = 4$ **3)** $x^2 - y^2 = 2$ **4)** $x^2 + y^2 = 4$

76 The locus of a point which is collinear with the points (3, 4) and (-4, 3) is

1) $2x + 3y - 12 = 0$ **2)** $2x + 3y + 12 = 0$ **3)** $2x - 3y + 12 = 0$ **4)** $x - 7y + 25 = 0$

77 The ends of hypotenuse of a right angled triangle are (a, 0) (-a, 0) then the locus of third vertex is

1) $x^2 - y^2 = a^2$ **2)** $x^2 + y^2 = a^2$

3) $x^2 + y^2 + a^2 = 0$ **4)** $x^2 - y^2 + a^2 = 0$

78 When axes are rotated by an angle of 135^0 initial coordinates of (4, -3) are

1) $\left(\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$ **2)** $\left(\frac{1}{\sqrt{2}}, \frac{-7}{\sqrt{2}}\right)$

3) $\left(\frac{-1}{\sqrt{2}}, \frac{-7}{\sqrt{2}}\right)$ **4)** $\left(\frac{-1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

79 The origin is shifted to (1, 2) the equation $y^2 - 8x - 4y + 12 = 0$ changes to $y^2 + 4ax = 0$ then $a =$

1) 2 **2)** -2 **3)** 1 **4)** -1

80 If $A = (4, 0) B = (-4, 0)$ are any two points and $PA - PB = 4$. The locus of P is

1) $3x^2 + y^2 = 12$ **2)** $3x^2 - y^2 = 12$ **3)** $3x^2 - 3y^2 = 9$ **4)** $3x^2 + y^2 = 8$

PHYSICS

81 If a car covers $2/5^{th}$ of the total distance with v_1 speed and $3/5^{th}$ distance with v_2 then the average speed is

1) $\frac{1}{2}\sqrt{v_1 v_2}$ **2)** $\frac{v_1 + v_2}{2}$

3) $\frac{2v_1 v_2}{v_1 + v_2}$ **4)** $\frac{5v_1 v_2}{3v_1 + v_2}$

82 A person walks along a straight road from his house to a market 2.5 kms away with a speed of 5 km/hr and instantly turns back and reaches his house with a speed of 7.5 km/hr. The average speed of the person during the time interval 0 to 50 minutes is (in m/sec)

1) $4\frac{2}{3}$ **2)** $\frac{5}{3}$ **3)** $\frac{5}{6}$ **4)** $\frac{1}{3}$

83 The reaction time for an automobile driver is 0.7 sec. If the automobile can be decelerated at $5m/s^2$ calculate the total distance travelled in coming to stop from an initial velocity of 8.33 m/s after a signal is observed.

1) 12.77 m **2)** 14.82 m **3)** 16.83 m **4)** 19.65 m

84 If the particle is moving along a straight line given by the relation $x = 2 - 3t + 4t^3$ where s is in cms and t in sec. Its average velocity during the third sec is.

1) 73 cm/s **2)** 80 cm/s **3)** 85 cm/s **4)** 90 cm/s

85 A man walks up a stationary escalator in 90 sec, when this man stands on a moving escalator he goes up in 60 sec. The time taken by the man to walk up the moving escalator is

1) 30s **2)** 45s **3)** 36s **4)** 48s

86 A police van moving on a highway with a speed of $30kmh^{-1}$ fires a bullet at a thief's car speeding away in the same direction with a speed of $192kmh^{-1}$. If the muzzle speed of the bullet is $150ms^{-1}$ the speed with which the bullet hit the thief's car is

1) 42 m/s **2)** 105 m/s **3)** 145 m/s **4)** 180 m/s

87 A body released from the top of a tower of height h takes T seconds to reach the ground. The position of the body at T/4 seconds is

1) at $\frac{h}{16}$ from the ground **2)** $at\frac{h}{4}$ from the top of the tower

3) at $\frac{15h}{16}$ from the ground **4)** at $\frac{3h}{16}$ from the top of the tower

88 A body is dropped from a height 122.5m. If it stopped after 3 seconds and again released the further time of descent is $(g = 9.8m/s^2)$

1) 2s **2)** 3s **3)** 4s **4)** 5s

89 A splash is heard 3.12 s after a stone is dropped into a well 45m deep. The speed of sound in air is $(g = 10ms^{-2})$

1) $330ms^{-1}$ **2)** $375ms^{-1}$ **3)** $340ms^{-1}$ **4)** $346ms^{-1}$

90 A body is projected vertically up with u. its velocity at half its maximum height is

1) $\frac{u}{2}$ **2)** $\frac{u^2}{2}$

3) $\sqrt{2}u$ **4)** $\frac{u}{\sqrt{2}}$

91 A stone is thrown vertically up from a bridge with velocity $3ms^{-1}$ if it strikes the water under the bridge after 2s, the bridge is at a hight of $(g = 10ms^{-2})$

1) 26 m **2)** 14 m **3)** 7 m **4)** 20 m

92 A person in lift which ascents up with acceleration $10ms^{-2}$ drops a stone from a height 10m. The time of descent is $(g = 10ms^{-2})$

1) 1s **2)** 2s **3)** 1.5s **4)** 3s

93 A stone thrown vertically up with velocity v reaches three points A,B and C with velocities $\frac{v}{2}$, $\frac{v}{4}$ and $\frac{v}{8}$ respectively. Then AB:BC is

1) 1:1 **2)** 2 :1 **3)** 4 :1 **4)** 1:4

94 A helicopter is ascending vertically with a speed of $8.0ms^{-1}$. At a height of 12m above the earth, a package is dropped from a window. How much time does it take for the package to reach the ground?

1) 1.23s **2)** 3.23s **3)** 5.83s **4)** 2.53s

95 The displacement time graphs of two moving particles make angles of 30^0 and 45^0 with the x-axis. The ratio of the two velocities is

1) $\sqrt{3}:1$ **2)** 1 : 1 **3)** 1 : 2 **4)** $1:\sqrt{3}$

96 A particle traversed along a straight line for first half time with velocity v_0 for the remaining part, half of the distance is traversed with velocity v_1, and other half distance with velocity v_2. Find the mean velocity of the particle for the total journey.

1) $\frac{2v_0(v_1+v_2)}{v_1+v_2+2v_0}$ **2)** $\frac{v_0(v_1+v_2)+2v_1v_2}{2(v_1+v_2)}$

3) $\frac{v_1+v_2}{2}$ **4)** $\frac{v_0+2v_1v_2}{2(v_1+v_2)}$

97 A car accelerates from rest at a constant rate α for some time, after which it decelerates at a constant rate β and comes to rest. If the total time elapsed is t, then the maximum velocity aequired by the car is

1) $\left(\frac{\alpha^2+\beta^2}{\alpha\beta}\right)t$

2) $\left(\frac{\alpha^2-\beta^2}{\alpha\beta}\right)t$

3) $\frac{\alpha\beta t}{\alpha+\beta}$

4) $\frac{\left(\alpha^2+\beta^2\right)t}{\alpha\beta}$

98 Water drops fall from the roof of a building 20m high at regular time intervals. If the first drop strikes the floor when the sixth drop begins to fall the heights of the second and fourth drops from the ground at that instant are $(g = 10ms^{-2})$

1) 12.8m and 3.2m **2)** 12.8m and 7.2m **3)** 19.2m and 0.8m **4)** 7.2m and 16.8m

99 Two balls are projected simultaneously with the same speed from the top of a tower one upwards and the other downwards. If they reach the ground in 6s and 2s the height of the tower is $(g = 10ms^{-2})$

1) 120m **2)** 60m **3)** 80m **4)** 30m

100 For the velocity-time graph shown in figure below the distance covered by the body in last two seconds of its motion is what fraction of the total distance covered by it in all the seven seconds

1) 1/8 **2)** 1/6 **3)** 1/4 **4)** 1/2

101 A train travels from town A to town B with a constant speed of 18m/s and return back to town A with a constant speed of $36ms^{-1}$. Find its average speed during the journey.

1) $\frac{72}{5}ms^{-1}$ **2)** $\frac{36}{3}ms^{-1}$

3) $\frac{72}{3}ms^{-1}$ **4)** $\frac{36}{5}ms^{-1}$

102 The acceleration at the end of 2s of a particle whose motion is represented by the equation $s = 4t^3 - 8t^2 + 5t + 4$ is

1) $32ms^{-2}$ **2)** $40ms^{-2}$ **3)** $37ms^{-2}$ **4)** $35ms^{-2}$

103 A car covers a distance at speed of $60kmh^{-1}$ it returns and comes back to the original point moving at a speed of v. If the average speed for the round trip is $48kmh^{-1}$ then the magnitude of v is

1) $40kmh^{-1}$ **2)** $36kmh^{-1}$ **3)** $44kmh^{-1}$ **4)** $32kmh^{-1}$

104 The correct position (x)-time (t) graph for particle moving with negative acceleration is

1) 

2) 

3) 

4) 

105 A ball is thrown upward from the ground with an initial speed of V. At the same instant another ball is dropped from a building of height 20m. €if the balls are at the same height after 0.8 sec then the magnitude of v is $(g = 10ms^{-2})$

1) $15ms^{-1}$ **2)** $25ms^{-1}$ **3)** $12.5ms^{-1}$ **4)** $18.5ms^{-1}$

106 A car is moving along a straight line is brought to a stop within a distance of 200m and in time 10s. The initial speed of the car is

1) $25ms^{-1}$ **2)** $50ms^{-1}$ **3)** $75ms^{-1}$ **4)** $40ms^{-1}$

107 A ball is dropped from a tower of height 80m. The time it takes to cover the last 50% of its fall is $(g = 10ms^{-2})$

1) $2\sqrt{2}s$ **2)** 1.17 s **3)** 4s **4)** 2.0 s

108 Acceleration of a body whose displacement follows the equation $3s = 9t + 5t^2$ is

1) 5/3 **2)** 14/3 **3)** 10/3 **4)** 19/3

109 If a 100m long train needs 7.2 seconds to cross an object moving in a direction opposite to the train's direction with a speed of 5 kmph. then find the velocity of the train

1) 40kmph **2)** 25kmph **3)** 45kmph **4)** 20kmph

110 A rifle bullet loses $(1/25)^{th}$ of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is

1) 5 **2)** 10 **3)** 11 **4)** 13

111 A train of 150m length is going towards north direction at a speed of $10ms^{-1}$. A parrot flies at the speed of $5ms^{-1}$ towards south direction parallel to the railway track. The time for which the parrot flies alongside the train is

1) 12s **2)** 30s **3)** 10s **4)** 5s

112 The velocity of a particle is given by $v = 2t^2 - 8t + 15ms^{-1}$ find its instantaneous acceleration at $t = 5s$

1) $18ms^{-2}$ **2)** $20ms^{-2}$ **3)** $5ms^{-2}$ **4)** $12ms^{-2}$

113 $y = (Pt^2 - Qt^3)$m is the vertical displacement of a ball which is moving in vertical plane. Then the maximum height that the ball can reach is

1) $\frac{27P^3}{4Q^2}$ **2)** $\frac{4Q^2}{27P^3}$

3) $\frac{4P^3}{27Q^2}$ **4)** $\frac{27Q^2}{4P^3}$

114 A student is at a distance 16m from a bus when the bus begins to move with a constant acceleration of $9ms^{-2}$. The minimum velocity with which the student should run towards the bus so as the catch it is $\alpha\sqrt{2}ms^{-1}$. The value of α is

1) 10 **2)** 12 **3)** 15 **4)** 20

115 A biker travels 1/3 of the distance L with speed v_1 and $\frac{2}{3}$ of the distance with speed v_2 then the average speed is

1) $\frac{v_1v_2}{v_1+v_2}$ **2)** $\frac{3v_1v_2}{2v_1+v_2}$

3) $\frac{3v_1v_2}{v_1+2v_2}$ **4)** $\frac{v_1+v_2}{v_1v_2}$

116 A ball is thrown upward from the top of a building at an angle of 30^0 to the horizontal and with an initial speed of $20ms^{-1}$. If the ball strikes the ground after 3s then the height of the building is $(g = 10ms^{-1})$

1) 10 m **2)** 15 m **3)** 20 m **4)** 25 m

117 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

1) $\frac{v}{g}\left[1+\sqrt{\frac{2gh}{v^2}}\right]$

2) $\frac{v}{g}\left[1-\sqrt{1+\frac{2h}{g}}\right]$

3) $\frac{v}{g}\left[1+\sqrt{1+\frac{2gh}{v^2}}\right]$

4) $\frac{v}{g}\left[1+\sqrt{v^2+\frac{2gh}{v^2}}\right]$

118 A stone falls freely such that the distance covered by it in the last second of its motion is equal to the distance covered by it in the first 5s it is in air for .....s

1) 12 **2)** 13 **3)** 25 **4)** 26

119 Simultaneously from the top of a tower when ball-1 is thrown horizontally and ball-2 is just dropped in the absence of air resistance which among the following options is correct?

1) Ball-1 reaches the ground first

2) Ball-2 reaches the ground first

3) Both will reach the ground simultaneously

4) either ball-1 or ball-2 reach the ground first depending on which ever is heavier

120 A car moving with a velocity $6.25ms^{-1}$ is decelerated with $2.5\sqrt{v}ms^{-2}$ (v is instantaneous velocity) time taken by the car to come to rest is

1) 2s **2)** 3s **3)** 2.5s **4)** 4s

CHEMISTRY

121 The value of e/m for an electron is

1) $1.78 \times 10^8\ c/g$ **2)** $1.6724 \times 10^{-24}\ c/g$

3) $0.005486c/g$ **4)** $1.00866\ c/g$

122 The nucleus of tritium consists of

1) 1 proton + 1 neutron **2)** 1 proton + 3 neutron

3) 1 proton + zero neutron **4)** 1 proton + 2 neutron

123 Sodium ion is isoelectronic with the atom.

1) Mg^{2+} **2)** Al^{3+} **3)** Ne **4)** N^{3-}

124 An atom differs from its ion in

1) Nuclear charge **2)** Mass number

3) Number of electrons **4)** Number of neutrons

125 When alpha particles are sent through a thin metal foil, most of them go straight through the foil because

1) Alpha particles are much heavier then electrons **2)** Alpha particles are positively charged

3) Most part of the atom is empty **4)** Alpha particles move with high velocity

126 Which of the following radiation following has highest wave number?

1) Microwaves **2)** X-rays **3)** I.R - rays **4)** Radiowaves

127 The number of neutrons in the dipositive ion of zinc ion (Mass numbers of Zn=65)

1) 35 **2)** 33 **3)** 65 **4)** 67

128 The charge of an electron is 1.6×10^{-19} coulomb. What will be the value of charge on Na^{+} Ion

1) $1.6 \times 10^{-19}C$ **2)** $3.2 \times 10^{-19}C$

3) $2.4 \times 10^{-19}C$ **4)** $11 \times 1.6 \times 10^{-19}C$

129 The incorrect statement regarding cathode rays is

1) They travel is straight line

2) They depend on the nature of the gas

3) They are deflected by magnetic as well as electric fields

4) they produce mechanical effects

130 According to Planck's Quantum theory, the correct statements are
I) The vibrating particle in the black body does not emit continuously
II) Radiation is emitted in the form of small packets called Quanta
III) Energy associated with emitted radiations is inversely proportional to frequency
IV) The emitted radiant energy is propagated in the form waves.

1) I, II, III **2)** II, III **3)** I, II, IV **4)** II, IV, III

131 Rutherford's alpha ray scattering experiment showed for the time that the atom has

1) Nucleus **2)** Proton **3)** Electron **4)** Neutron

132 In electromagnetic radiation, Which of the following has greater wavelength then visible light?

1) U.V-rays **2)** I.R-rays **3)** Gamma rays **4)** X-rays

133 Which of the following is not an electromagnetic radiation?

1) Gamma rays **2)** Alpha rays **3)** Radio waves **4)** X-rays

134 Energy of a photon with a wave length of 450 nm is

1) $4.36 \times 10^{-12}ergs$ **2)** $4.36 \times 10^{-13}ergs$

3) $4.36 \times 10^{-20}ergs$ **4)** $4.36 \times 10^{-11}ergs$

135 A wave has a frequency of $3 \times 10^{15}sec^{-1}$. The energy of that photon is

1) $1.6 \times 10^{-12}erg$ **2)** $3.2 \times 10^{-11}erg$

3) $2.0 \times 10^{-11}erg$ **4)** $3 \times 10^{15}erg$

136 Total number of spectral lines when electron jumps from 8th orbit to 2nd orbit

1) 6 **2)** 36 **3)** 21 **4)** 38

137 Kinetic energy of photoelectrons is independent of the _____of incident radiation.

1) Wavelength **2)** Wave number **3)** Frequency **4)** Intensity

138 The radius of which of the following orbit is same as that of the 1st Bohr's orbit of H-atom

1) $Be^{3+}(n=2)$ **2)** $Li^{2+}(n=3)$ **3)** $Li^{2+}(n=2)$ **4)** $He^{+}(n=2)$

139 The wave length of light having wave number $4000\ cm^{-1}$ is

1) $2.5\mu m$ **2)** $250\mu m$ **3)** $25\mu m$ **4)** $25nm$

140 The energy of an electromagnetic radiation is $19.875 \times 10^{-13}\ ergs$. What is the wave number in cm^{-1} ?

1) 1000 **2)** 10^6 **3)** 100 **4)** 10,000

141 Ionisation energy of He^+ is $19.6 \times 10^{-18} J/atom$. The energy of the 1st stationary state of Li^{2+} is

1) $-4.41 \times 10^{-18} J/atom$ **2)** $-8.72 \times 10^{-18} J/atom$

3) $-44.1 \times 10^{-16} J/atom$ **4)** $-4.41 \times 10^{-17} J/atom$

142 The work function of a metal is 4.2 eV. If radiation of $2000\ A^0$ fall on the metal, then the kinetic energy of is

1) $1.6 \times 10^{-19} J$ **2)** $1.6 \times 10^{10} J$

3) $6.4 \times 10^{-10} J$ **4)** $3.2 \times 10^{-19} J$

143 In Bohr series of lines of hydrogen spectrum, the third line from the red end corresponds to which one of the following inter - orbit jumps of the electron for Bohr orbits in an atom of hydrogen?

1) $3 \rightarrow 2$ **2)** $5 \rightarrow 2$

3) $4 \rightarrow 1$ **4)** $2 \rightarrow 5$

144 The wavelength of the first member of the Balmer series in hydrogen spectrum is xA^0. Then the wave length $(in\ A^0)$ of the first member of Lyman series in the same spectrum is

1) $\frac{5}{27}x$ **2)** $\frac{4}{3}x$

3) $\frac{27}{5}x$ **4)** $\frac{5}{36}x$

145 The number of photons of light wave number 'x' in 10 J of energy source is:

1) 10 hcx **2)** $\frac{hc}{10x}$

3) $\frac{10}{hcx}$ **4)** $\frac{hcx}{10x}$

146 Bohr's theory is applicable to

1) Li^{+2} **2)** Li^{+}

3) He^{+} **4)** Both 1 and 3

147 Energy of an electron in n^{th} Bohr orbit is given as

1) $-\frac{n^2h^2}{4\pi^2mZe^2}$ **2)** $-\frac{2\pi^2Z^2me^4}{n^2h^2}$

3) $-\frac{2\pi Ze^2}{nh}$ **4)** $-\frac{n^2h^2}{2\pi^2Z^2me^4}$

148 The energy of the electron when it is at an infinite distance from the nucleus is

1) Infinity **2)** Zero

3) Minimum **4)** Can not be predicted

149 Radius of 3^{rd} Bohr orbit of hydrogen atom

1) $6.529A^0$ **2)** $2.116A^0$ **3)** $4.761A^0$ **4)** $8.464A^0$

150 If the energy of H-atom in the ground state is -E, the velocity of photo-electron emitted when a photon having energy E_p strikes a stationary Li^{2+} ion in ground state, is given by:

1) $v = \sqrt{\frac{2(E_p - E)}{m}}$ **2)** $v = \sqrt{\frac{2(E_p + 9E)}{m}}$

3) $v=\sqrt{\frac{2(E_p-9E)}{m}}$ **4)** $v=\sqrt{\frac{2(E_p-3E)}{m}}$

151 The angular momentum of an electron present in the excited state of hydrogen is $1.5h/\pi$. The electron is present in

1) Third orbit **2)** Second orbit **3)** Fourth orbit **4)** Fifth orbit

152 According to Bohr's theory, the angular momentum of electron in 5^{th} orbit is

1) $2.5\frac{h}{\pi}$ **2)** $25\frac{h}{\pi}$

3) $1.0\frac{h}{\pi}$ **4)** $10\frac{h}{\pi}$

153 When an electron with charge 'e' and mass 'm' moves with velocity 'v' around the nucleus having nuclear charge 'Z' in a circular orbit of radius 'r' , the potential energy of electron is

1) $\frac{Ze^2}{r}$ **2)** $\frac{Ze^2}{r^2}$

3) $\frac{-Ze^2}{r}$ **4)** $\frac{mv^2}{r}$

154 The change in velocity when electron jumps from the first orbit to the second orbit is

1) Half its original velocity **2)** Twice its original velocity

3) One fourth its original velocity **4)** Equal to its original velocity

155 An electron is revolving in the 2^{nd} orbit of He^+ ion . To this if 12.1 eV of energy supplied. Then to which orbit it will be excited.

1) 6 **2)** 8 **3)** 4 **4)** 2

156 The energy of an electron in the first Bohr orbit of H atom is -13.6 eV. The possible energy value of the excited state for electrons in Bohr orbits of hydrogen is:

1) -3.4 eV **2)** -4.2 eV **3)** -6.8 eV **4)** +6.8 eV

157 What is the ratio of time pereids of $e^{\ominus}(T_1/T_2)$ is second orbit of H atom to 3rd orbit of He^+

1) 8/27 **2)** 32/27 **3)** 27/32 **4)** 27/8

158 The velocity of an electron in excited state of H-atom is $1.093\times10^6 m/s$. What is the circumference of this orbit?

1) $3.32\times10^{-10}m$ **2)** $6.64\times10^{-10}m$

3) 13.30×10^{-10} **4)** $13.28\times10^{-8}m$

159 Which of the following transistions in hydrogen atom will require the highest amount of energy

1) n=1 to n=2 **2)** n=1 to n=3 **3)** n=2 to n=1 **4)** n=3 to n=4

160 The total energy of electron in an atom is a combination of potential energy (P.E) and kinetic energy (K.E). If total energy is -E for an electron in an atom, then its (K.E) and (P.E) respectively are

1) 2E, -E **2)** 2E, E **3)** E, -2E **4)** E, -E