MY DREAMz ACADEMY

Dilsuknagar,HYD.Contact:7995918905/06.

Test Name : EAPCET GRAND TEST -01

Batch : MPC LONG TERM

No Questions : 160 **Time : 180 Min**

IMPORTANT INSTRUCTIONS:

Please read the instructions carefully

- The candidate must immediately fill their details on the **OMR SHEET** before attempting the test booklet.
- Duration of the test is **3hrs (180Min)**,test booklet contains **160 questions**.
- Each question carries **1 Marks** for each correct response .The maximum marks are **160**.
- Use **BLUE/BLACK** Ball point pen only for writing responses on **OMR SHEET**.Use of pencil,sketch pen,gell pens are strictly prohibited.
- No candidate is allowed to carry any textual material,printed or written,bits of papers,pager,mobile phone any electronic gadgets etc.. Except the Identity card and hall ticket into the examination hall.
- **Rough work** is to be done only on the space provided in the test booklet.
- Don't fold or make any stray marks on the **ANSWER SHEET**.
- Use of white fluid for correction is not permissiable on the ANSWER SHEET.
- On the completion of the test the candidate must hand over the answer sheet to the invigilator after completing the time.However the candidate is allowed to take away this test booklet with them.

ALL THE BEST

NAME:.....

BATCH:..... TEST DATE:.....

ROLL NO:.....INVIGILATOR SIGN:.....

SET: A

Test Id: 686666

Part - A Mathematics

Section - I: Single Correct

This section contains a total of 80 questions.
All questions in this section are mandatory.
For every correct response you shall be awarded 1 marks.
For every incorrect response 0 marks shall be deducted.

1. Taking positive roots, the expression $\frac{10^3-1}{\sqrt{(1000)^2-1999}}$ when simplified reduces to

(a) 999 (b) 1000
(c) 1001 (d) 1

2. The domain of the function $f(x)=\frac{1}{\log_{10}(1-x)}+\sqrt{x+2}$ is

(a) $[-3,-2.5]\cup[-2.5,-2]$
(b) $[-2,0)\cup(0,1)$
(c) $[0,1]$
(d) None of these.

3. The function $f(x)=\sin\left(\log_e(x+\sqrt{x^2+1})\right)$ is

(a) Even function
(b) Odd function
(c) Neither even nor odd
(d) Periodic function

4. Let $A=\begin{bmatrix}5 & 5\alpha & \alpha\\ 0 & \alpha & 5\alpha\\ 0 & 0 & 5\end{bmatrix}$ If $|A^2|=25$, then $|\alpha|$ equals:

(a) 5^2
(b) 1
(c) $\frac{1}{5}$
(d) 5

5. Let for $A=\begin{bmatrix}1 & 2 & 3\\ \alpha & 3 & 1\\ 1 & 1 & 2\end{bmatrix}$, $|A|=2$. If $|2\ \mathrm{adj}(2\mathrm{adj}(2A))|=32^n$, then $3n+\alpha$ is equal to

(a) 10
(b) 9
(c) 12
(d) 11

6. Matrix $A=\begin{bmatrix}1 & 0 & -k\\ 2 & 1 & 3\\ k & 0 & 1\end{bmatrix}$ is invertible for

(a) no value of k
(b) exactly one value of k
(c) exactly two values of k
(d) all real k

7. The solution of the equation $\begin{bmatrix}1 & 0 & 1\\ -1 & 1 & 0\\ 0 & -1 & 1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}1\\ 1\\ 2\end{bmatrix}$ is $(x,y,z)=$

(a) $(1,1,1)$
(b) $(0,-1,2)$
(c) $(-1,2,2)$
(d) $(-1,0,2)$

8. If the shortest distance between the straight lines $3(x-1)=6(y-2)=2(z-1)$ and $4(x-2)=2(y-\lambda)=(z-3),\lambda\in R$ is $\frac{1}{\sqrt{38}}$, then the integral value of λ is equal to

(a) 2
(b) 5
(c) 3
(d) -1

9. If the lines $\vec{r}=\hat{i}+\hat{j}+\hat{k}+\lambda(\hat{i}-2\hat{j})$ and $\vec{r}=\hat{i}-\hat{j}-3\hat{k}+\mu(\hat{j}+2\hat{k})$ intersect each other, then $(\lambda+\mu)$ is equal to

(a) 2
(b) -1
(c) 0
(d) 1

10. If $\vec{a}=\hat{i}+3\hat{j}-2\hat{k}$ and $\vec{b}=4\hat{i}-2\hat{j}+4\hat{k}$, then $(2\vec{a}+\vec{b}).(\vec{a}-2\vec{b})$ equals -

(a) 14
(b) -14
(c) 0
(d) None

11. Let $\vec{u}=\hat{i}+\hat{j},\vec{v}=\hat{i}-\hat{j}$ and $\vec{w}=\hat{i}+2\hat{j}+3\hat{k}$. If $\hat{n}$ is a unit vector such that $\vec{u}.\hat{n}=0$ and $\vec{v}.\hat{n}=0$, then $|\vec{w}.\hat{n}|$ is equal to -

(a) 3 (b) 0
(c) 1 (d) 2

12. If $\vec{a}$ and $\vec{b}$ are perpendicular, then $\vec{a} \times \left(\vec{a} \times \left(\vec{a} \times \left(\vec{a} \times \vec{b}\right)\right)\right)$ is equal to

(a) $\vec{0}$

(b) $\frac{1}{2}\ \vec{a}\ ^4\vec{b}$

(c) $\vec{a} \times \vec{b}$

(d) $\vec{a}\ ^4\ \vec{b}$

13. If the expression $\cos\left(x - \frac{3\pi}{2}\right) + \sin\left(\frac{3\pi}{2} + x\right) + \sin(32\pi + x) - 18\cos(19\pi - x) + \cos(56\pi + x) - 9\sin(x + 17\pi)$ is expressed in the form of $a\sin x + b\cos x$, then $(a + b)$ is equal to :

(a) 17

(b) 27

(c) 13

(d) 23

14. $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 =$

(a) $4\cos^2\frac{\alpha - \beta}{2}$

(b) $4\sin^2\frac{\alpha - \beta}{2}$

(c) $4\cos^2\frac{\alpha + \beta}{2}$

(d) $4\sin^2\frac{\alpha + \beta}{2}$

15. If $\sin A = \frac{4}{5}$ and $\cos B = -\frac{12}{13}$, whrere A and B lie in first and third quadrant respectively, then $\cos(A + B) =$

(a) $\frac{56}{65}$

(b) $-\frac{56}{65}$

(c) $\frac{16}{65}$

(d) $-\frac{16}{65}$

16. The sum of all values of $\theta \in \left(0, \frac{\pi}{2}\right)$ satisfying $\sin^2 2\theta + \cos^4 2\theta = \frac{3}{4}$ is

(a) $\frac{2\pi}{4}$

(b) $\frac{\pi}{2}$

(c) $\frac{3\pi}{8}$

(d) π

17. If $\cos^{-1}x - \cos^{-1}\frac{y}{2} = \alpha$, then $4x^2 - 4xy\cos\alpha + y^2$ is equal to -

(a) $2\sin 2\alpha$

(b) 4

(c) $4\sin^2\alpha$

(d) $-4\sin^2\alpha$

18. Number of integral solutions of the equation $\operatorname{sgn}\left(\sin^{-1}\left[\frac{\pi x}{6}\right]\right) = 1$, where $[x]$ denotes the greatest integer less than or equal to x and sgn$x$ denotes signum function of x.

(a) 2 (b) 3 (c) 5 (d) 7

19. A man observes that when he moves up a distance c metres on a slope, the angle of depression of a point on the horizontal plane from the base of the slope is 30°, and when he moves up further a distance c metres the angle of depression of that point is 45°,. The angle of inclination of the slope with the horizontal is (Man starts from the bottom of the slope)

(a) 60°

(b) 45°

(c) 75°

(d) 30°

20. If R and r are the radii of the circumcircle and incircle of a regular polygon of n sides, each side being of length a, then a is equal to

(a) $2(R + r)\sin\frac{\pi}{2n}$

(b) $2(R + r)\tan\frac{\pi}{2n}$

(c) $2(R + r)$

(d) $2(R + r)\cos\frac{\pi}{2n}$

21. Let $z \in C$ be such that $|z| < 1$. If $\omega = \frac{5 + 3z}{5 - 5z}$, then

(a) $5\ Re(\omega) > 4$

(b) $5\ Re(\omega) > 1$

(c) $4\ lm(\omega) > 5$

(d) $5\ lm(\omega) < 1$

22. If ω is a complex root of the equation $z^3 = 1$, then $\omega + \omega^{\left(\frac{1}{2} + \frac{3}{8} + \frac{9}{32} + \frac{127}{128} \cdots\right)}$ equals -

(a) -1

(b) 0

(c) 9

(d) i

23. The value of $\left(\frac{1 + i\sqrt{3}}{1 - i\sqrt{3}}\right)^6 + \left(\frac{1 - i\sqrt{3}}{1 + i\sqrt{3}}\right)^6$ is :

(a) 2

(b) -2

(c) 1

(d) 0

24. Let $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$. If $R(z)$ and $I(z)$ respectively denote the real and imaginary parts of z, then

(a) $I(z) = 0$

(b) $R(z) > 0$ and $I(z) > 0$

(c) $R(z) < 0$ and $I(z) > 0$

(d) $R(z) = -3$

25. If the quadratic equations $3x^2 + ax + 1 = 0$ and $2x^2 + bx + 1 = 0$ have a common root, then the value of the expression $5ab - 2a^2 - 3b^2$ is -

(a) 0

(b) 1

(c) -1

(d) None of these

26. Number of integral solutions of $\frac{x+2}{x^2+1} > \frac{1}{2}$ is:

(a) 0

(b) 1

(c) 2

(d) 3

27. One root of the following given equation $2x^5 - 14x^4 + 31x^3 - 64x^2 + 19x + 130 = 0$ is

(a) 1 (b) 3

(c) 5 (d) 7

28. The number of real roots of $3^{2x^2-7x+7} = 9$ is -

(a) 0 (b) 2

(c) 1 (d) 4

29. How many numbers greater than one hundred and divisible by 5 can be made from the digits $3, 4, 5, 6$, if no digit is repeated

(a) 6

(b) 12

(c) 24

(d) 30

30. How many six letter words be made out of the letters of $'ASSIST'$? In how many words the alphabet S alternates with other letters ?

(a) $120, 6$

(b) $720, 12$

(c) $120, 12$

(d) $720, 24$

31. If ${}^{2n}C_3 : {}^{n}C_3 : 10 : 1$, then the ratio $(n^2 + 3n) : (n^2 - 3n + 4)$ is:

(a) $27 : 11$

(b) $35 : 16$

(c) $2 : 1$

(d) $65 : 37$

32. The coefficient of x^4 in the expansion of $\left(\frac{x}{2} - \frac{3}{x^2}\right)^{10}$ is

(a) $\frac{405}{256}$

(b) $\frac{504}{259}$

(c) $\frac{450}{263}$

(d) None

33. The co-efficient of x^n in the expansion of $(1 - 2x + 3x^2 - 4x^3 + \ldots\ldots\infty)^{-n}$ is equal to

(a) $\frac{(2n)!}{n!}$

(b) $\frac{(2n)!}{n!n!}$

(c) $n!$

(d) $(2n)!$

34. The mean and variance of seven observations are 8 and 16, respectively. If 5 of the observations are $2, 4, 10, 12, 14$, then the product of the remaining two observations is:

(a) 45

(b) 40

(c) 48

(d) 49

35. The first of the two samples in group has 100 items with mean 15 and standard deviation 3.
If the whole group has 250 items with mean 15.6 and standard deviation $\sqrt{13.44}$,
then the standard deviation of the second sample is

(a) 5 (b) 6

(c) 4 (d) 8

36. An unbiased coin is tossed. If the outcome is a head then a pair of unbiased dice is rolled and the sum of the numbers obtained on them is noted. If the toss of the coin results in tail then a card from a well-shuffled pack of nine cards numbered $1, 2, 3, \ldots, 9$ is randomly picked and the number on the card is noted. The probability that the noted number is either 7 or 8 is

(a) $\frac{13}{36}$

(b) $\frac{15}{72}$

(c) $\frac{19}{36}$

(d) $\frac{19}{72}$

37. A man and his wife appear for an interview for two posts. The probability of the husband's selection is $\frac{1}{7}$ and that of the wife's selection is $\frac{1}{5}$. What is the probability that only one of them will be selected.

(a) $\frac{1}{7}$

(b) $\frac{2}{7}$

(c) $\frac{3}{7}$

(d) None of these

38. Bag I contains 3 red, 4 black and 3 white balls and Bag II contains 2 red, 5 black and 2 white balls. One ball is transferred from Bag I to Bag II and then a ball is draw from Bag II. The ball so drawn is found to be black in colour. Then the probability, that the transferred ball is red, is:

(a) $\frac{4}{9}$

(b) $\frac{5}{18}$

(c) $\frac{1}{6}$

(d) $\frac{3}{10}$

39. If $A(2,-3)$ and$B(-2,1)$ are two vertices of a triangle and third vertex moves on the line $2x+3y=9$, then the locus of the centroid of the triangle is -

(a) $x-y=1$

(b) $2x+3y=1$

(c) $2x+3y=3$

(d) $2x-3y=1$

40. To remove xy term from the second degree equation $5x^2+8xy+5y^2+3x+2y+5=0$, the coordinates axes are rotated through an angle θ, then θ equals-

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{4}$

(c) $\frac{3\pi}{8}$

(d) $\frac{\pi}{8}$

41. If the equation of base of an equilateral triangle is $2x-y=1$ and the vertex is $(-1,2)$, then the length of the side of the triangle is

(a) $\sqrt{\frac{20}{3}}$

(b) $\frac{2}{\sqrt{15}}$

(c) $\sqrt{\frac{8}{15}}$

(d) $\sqrt{\frac{15}{2}}$

42. The equation of the line which bisects the obtuse angle between the lines $x-2y+4=0$ and $4x-3y+2=0,$ is

(a) $(4-\sqrt{5})x-(3-2\sqrt{5})y+(2-4\sqrt{5})=0$

(b) $(4+\sqrt{5})x-(3+2\sqrt{5})y+(2+4\sqrt{5})=0$

(c) $(4+\sqrt{5})x+(3+2\sqrt{5})y+(2+4\sqrt{5})=0$

(d) None of these

43. The lines joining the points of intersection of curve $5x^2+12xy-8y^2+8x-4y+12=0$ and the line $x-y=2$ to the origin , makes the angles with the axes

(a) 30^0 and 45^0

(b) 45^0 and 60^0

(c) Equal

(d) Parallel to axes

44. The length of line segmenAB is14 if its direction ratio are $2,3,6$ then its direction cosines will be -

(a) $\pm\frac{2}{7}\pm\frac{3}{7},\pm\frac{6}{7}$

(b) $\pm\frac{2}{1}4,\pm\frac{3}{14},\pm\frac{6}{14}$

(c) $\pm\frac{2}{7}\mp\frac{3}{7},\pm\frac{6}{7}$

(d) None of these

45. Let P be the plane, which contains the line of intersection of the planes, $x+y+z-6=0$ and $2x+3y+z+5=0$ and it is perpendicular to the xy-plane. Then the distance of the point $(0,\ 0,\ 256)$ from P is equal to:

(a) $63\sqrt{5}$

(b) $\frac{17}{\sqrt{5}}$

(c) $205\sqrt{5}$

(d) $\frac{11}{\sqrt{5}}$

46. If $P(6,3,2);Q(5,1,4);R(3,-4,7)$ and $S(0,2,5)$ are given points then the projection of PQ on RS is equal to -

(a) $\frac{13}{7}$

(b) 13

(c) $\frac{\sqrt{13}}{7}$

(d) $\frac{13}{\sqrt{7}}$

47. $\lim_{x\to\infty}\sqrt{\frac{x+\sin x}{x-\cos x}}$ is :

(a) 0

(b) 1

(c) -1

(d) None of these

48. If $f(x)=\begin{cases}6\cdot 5^x & , \quad x\le 0\\ 2a+x & , \quad x>0\end{cases}$ is continuous at $x=0$, then the value of a is:

(a) 1 (b) 2

(c) 3 (d) None

49. If $x^m.y^n=(x+y)^{m+n}$, then $\frac{dy}{dx}$ is

(a) $\frac{x+y}{xy}$

(b) xy

(c) $\frac{x}{y}$

(d) $\frac{y}{x}$

50. $f(x)=\begin{vmatrix}x^3 & x^2 & 3x^2\\ 1 & -6 & 4\\ p & p^2 & p^3\end{vmatrix}$, here p is a constant, then $\frac{d^3f(x)}{dx^3}$ is

(a) Proportional to x^2

(b) Proportional to x

(c) Proportional to x^3

(d) A constant

51. The displacement of a particle in time t is given by $s=2t^2-3t+1$. The acceleration is

(a) 1 (b) 3

(c) 4 (d) 5

52. If $1^\circ=\alpha$ radians then the approximate value of $\cos 60^\circ 1'$ is:

(a) $\frac{1}{2}+\frac{\alpha\sqrt{3}}{120}$

(b) $\frac{1}{2}-\frac{\alpha}{120}$

(c) $\frac{1}{2}-\frac{\alpha\sqrt{3}}{120}$

(d) $\frac{1}{2}$

53. The length of subtangent at the point $x=a$ of the curve $ay^2=(a+x)^2(3a-x)$ is -

(a) a

(b) $2a$

(c) $4a$

(d) $6a$

54. The maximum value of $f(x)=x^3-3x$ subject to $x^4+36\le 13x^2$

(a) 15

(b) 18

(c) 25

(d) ∞

55. The locus of the centre of a circle which cuts orthogonally the circle $x^2+y^2-20x+4=0$ and which touches $x=2$ is

(a) $y^2=16x+4$

(b) $x^2=16y$

(c) $x^2=16y+4$

(d) $y^2=16x$

56. The length of the common chord of the circle $x^2+y^2+4x+6y+4=0$ and $x^2+y^2+6x+4y+4=0$ is -

(a) $\sqrt{10}$

(b) $\sqrt{22}$

(c) $\sqrt{34}$

(d) $\sqrt{38}$

57. If a circle$C$ passing through the point$(4,0)$ touches the circle$x^2+y^2+4x-6y=12$ externally at the point$(1,-1)$, then the radius of C is

(a) 5

(b) $2\sqrt{5}$

(c) $\sqrt{57}$

(d) 4

58. The line $2x-y+1=0$ is a tangent to the circle at the point $(2,5)$ and the center of the circle lies on $x-2y=4$. Then, the radius of the circle is:

(a) $3\sqrt{5}$

(b) $5\sqrt{3}$

(c) $5\sqrt{4}$

(d) $4\sqrt{5}$

59. From $(3,4)$ chords are drawn to the circle $x^2+y^2-4x=0$. The locus of the mid points of the chords is:

(a) $x^2+y^2-5x-4y+6=0$

(b) $x^2+y^2+5x-4y+6=0$

(c) $x^2+y^2-5x+4y+6=0$

(d) $x^2+y^2-5x-4y-6=0$

60. Set of values of m for which a chord of slope m of the circle $x^2+y^2=4$ touches parabola $y^2=4ax$, is

(a) $\left(-\infty,-\sqrt{\frac{\sqrt{2}-1}{2}}\right)\cup\left(\sqrt{\frac{\sqrt{2}-1}{2}},\infty\right)$

(b) $(-\infty,-1)\cup(1,\infty)$

(c) $(-1,1)$

(d) $(-\infty,\infty)$

61. PQ is any focal chord of the parabola $y^2=32x$. The length of PQ can never be less than

(a) 40

(b) 45

(c) 32

(d) 48

62. Let E be the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and C be the circle $x^2+y^2=9$. Let P and Q be the points $(1,2)$ and $(2,1)$ respectively. Then

(a) Q lies inside C but outside E

(b) Q lies outside both C and E

(c) P lies inside both$C$ and E

(d) P lies inside C but outside E

63. Let θ be the acute angle between the tangents to the ellipse $\frac{x^2}{9}+\frac{y^2}{1}=1$ and the circle $x^2+y^2=3$ at their point of intersection in the first quadrant. Then $\tan\theta$ is equal to:

(a) $\frac{5}{2\sqrt{3}}$

(b) $\frac{2}{\sqrt{3}}$

(c) $\frac{4}{\sqrt{3}}$

(d) 2

64. The condition that the line $p=x\cos\alpha+y\sin\alpha$ becomes a tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

(a) $p=a\cos\alpha-b\sin\alpha$

(b) $p=a^2\cos\alpha-b^2\sin\alpha$

(c) $p^2=a^2\cos^2\alpha+b^2\sin^2\alpha$

(d) $p^2=a^2\cos^2\alpha-b^2\sin^2\alpha$

65. The integral $\int\frac{x^2(x\sec^2x+\tan x)}{(x\tan x+1)^2}dx$ is equal to

(a) $-\frac{x^2}{x\tan x+1}+c$

(b) $2\log_e|x\sin x+\cos x|+c$

(c) $-\frac{x^2}{x\tan x+1}+2\log_e|x\sin x+\cos x|+c$

(d) $\frac{x^2}{x^2\tan x-1}-2\log_e|x\sin x+\cos x|+c$

66. If $\int\frac{x^4+1}{x(x^2+1)^2}dx=A\ln|x|+\frac{B}{1+x^2}+c$, where c is the constant of integration then:

(a) $A=1;\ B=-1$

(b) $A=-1;\ B=1$

(c) $A=1;\ B=1$

(d) $A=-1;\ B=-1$

67. Let $I_n=\int\tan^n x\,dx,(n>1)$. If $I_4+I_6=a\tan^5x+bx^5+C$, where C is a constant of integration, then the ordered pair (a,b) is equal to

(a) $\left(-\frac{1}{5},1\right)$

(b) $\left(\frac{1}{5},0\right)$

(c) $\left(\frac{1}{5},-1\right)$

(d) $\left(-\frac{1}{5},0\right)$

68. $\int_{-1}^{0}\frac{dx}{x^2+2x+2}=$

(a) 0

(b) $\frac{\pi}{4}$

(c) $\frac{\pi}{2}$

(d) $-\frac{\pi}{4}$

69. $\int_0^{\pi/2}\frac{\sin^2 9x}{\sin x}dx=$

(a) $1+\frac{1}{2}+\frac{1}{3}+\ldots.+\frac{1}{9}$

(b) $\frac{1}{2}+\frac{1}{4}+\ldots.+\frac{1}{18}$

(c) $1+\frac{1}{3}+\frac{1}{5}+\frac{1}{7}+\ldots.+\frac{1}{19}$

(d) $1+\frac{1}{3}+\frac{1}{5}+\ldots.+\frac{1}{17}$

70. The area enclosed within $|x-2|+|y-3|=1$ is

(a) $1\ sq.\ unit$

(b) $2\ sq.\ units$

(c) $3\ sq.\ units$

(d) none of these

71. Let $I=\int_a^b (x^4-2x^2)dx$. If I is minimum then the ordered pair (a,b) is

(a) $(-\sqrt{2},0)$

(b) $(0,\sqrt{2})$

(c) $(\sqrt{2},-\sqrt{2})$

(d) $(-\sqrt{2},\sqrt{2})$

72. Let $y=y(x)$ be the solution of the differential equation $\sin x\frac{dy}{dx}+y\cos x=4x,\ x\in(0,\pi)$. If $y\left(\frac{\pi}{2}\right)=0$, then $y\left(\frac{\pi}{6}\right)$ is equal to

(a) $-\frac{8}{9}\pi^2$

(b) $-\frac{4}{9}\pi^2$

(c) $\frac{4}{9\sqrt{3}}\pi^2$

(d) $\frac{-8}{9\sqrt{3}}\pi^2$

73. The differential equation of all parabolas whose axes are parallel to $y-$axis is

(a) $\frac{d^3y}{dx^3}=0$

(b) $\frac{d^2x}{dx^2}=c$

(c) $\frac{d^3y}{dx^3}+\frac{d^2x}{dy^2}=0$

(d) $\frac{d^2y}{dx^2}+2\frac{dy}{dx}=c$

74. If $n\in N$, then $11^{n+2}+12^{2n+1}$ is divisible by

(a) 113 (b) 123

(c) 133 (d) 143

75. Let R be a relation on $A=\{a,\ b,\ c\}$ such that $R=\{(a,\ a),\ (b,\ b),\ (c,\ c)\}$, then R is

(a) Reflexive only

(b) Symmetric only

(c) Non-transitive

(d) Equivalence

76. Let M denote the median of the following frequency distribution

Class	0 – 4	4 – 8	8 – 12	12 – 16	16 – 20
Frequency	3	9	10	8	6

Then $20M$ is equal to:

(a) 52

(b) 104

(c) 208

(d) 416

77. The existence of unique solution of the system $x+y+z=b,\ 2x+3y-z=6,\ 5x-y+az=10$ depends on-

(a) b only

(b) a only

(c) a and b

(d) neither a nor b

78. $\cos[\tan^{-1}\{\sin(\cot^{-1}x)\}]$ is equal to -

(a) $\sqrt{\frac{x^2+2}{x^2+3}}$

(b) $\sqrt{\frac{x^2+2}{x^2+1}}$

(c) $\sqrt{\frac{x^2+1}{x^2+2}}$

(d) None of these

79. $\int_0^1 \frac{dx}{\sqrt{1+x}-\sqrt{x}}$ is equal to -

(a) $\frac{2\sqrt{2}}{3}$

(b) $\frac{4\sqrt{2}}{3}$

(c) $\frac{8\sqrt{2}}{2}$

(d) None

80. $\int \frac{\sin x}{\sqrt{1+\cos x}}dx$ equals:

(a) $\sqrt{2}\cos\left(\frac{x}{2}\right)+c$

(b) $\sqrt{2}\sin\left(\frac{x}{2}\right)+c$

(c) $2\sqrt{2}\cos\left(\frac{x}{2}\right)+c$

(d) $-2\sqrt{2}\cos\left(\frac{x}{2}\right)+c$

Part - B Chemistry

Section - I: Single Correct

This section contains a total of 40 questions.
All questions in this section are mandatory.
For every correct response you shall be awarded 1 marks.
For every incorrect response 0 marks shall be deducted.

81. Which of the following orbitals has a shape different from the others ?

(a) d_{yz}

(b) $d_{x^2-y^2}$

(c) d_{xz}

(d) d_{z^2}

82. Consider the following statements :
(A) The principal quantum number 'n' is a positive integer with values of 'n' = 1, 2, 3, ...
(B) The azimuthal quantum number 'l' for a given 'n' (principal quantum number) can have values as 'l' = 0, 1, 2, ... n
(C) Magnetic orbital quantum number 'm_l' for a particular 'l' (azimuthal quantum number) has (2l + 1) values.
(D) ±1/2 are the two possible orientations of electron spin.
(E) For l = 5, there will be a total of 9 orbital.
Which of the above statements are correct?

(a) (A), (B) and (C)

(b) (A), (C), (D) and (E)

(c) (A), (C) and (D)

(d) (A), (B), (C) and (D)

83. The elements with atomic numbers 101 and 104 belong to, respectively :

(a) Group 11 and Group 4

(b) Actinoids and Group 4

(c) Actinoids and Group 6

(d) Group 6 and Actinoids

84. The compound that does not give a blue colour in Lassaigne's test is

(a) $C_6H_5–NH_2$

(b) CH_3CONH_2

(c) $NH_2–NH_2$

(d) $C_6H_5–NO_2$

85. The order of first ionization enthalpies of the elements Li, Be, B, Na is -

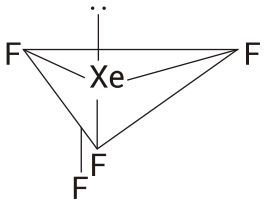
(a) Li > Be > B > Na

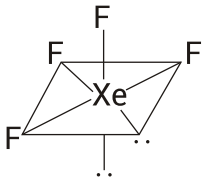
(b) Be > B > Li > Na

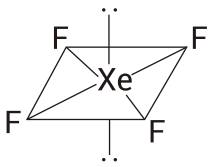
(c) Na > Li > B > Be

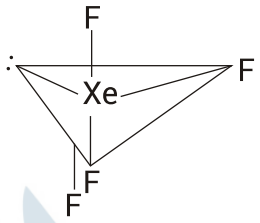
(d) Be > Li > B > Na

86. Which is the right structure of XeF_4 ?

(a) 

(b) 

(c) 

(d) 

87. In the context of carbon, which of the following is arranged in the correct order of electronegativity

(a) $sp > sp^2 > sp^3$

(b) $sp^3 > sp^2 > sp$

(c) $sp^2 > sp > sp^3$

(d) $sp^3 > sp > sp^2$

88. Oxidation number of Cr in CrO_5 is

(a) + 10 (b) + 6
(c) + 4 (d) + 5

89. Select the correct statement
A) Oxidation number of oxygen in H_2SO_5 are −1 and −2
B) H_2O_2 can act as both oxidizing as well reducing agent
C) n-factor is 2 in given reaction $2Cu^+ \longrightarrow Cu + Cu^{2+}$

(a) A only

(b) only C

(c) A and B only

(d) A, B and C

90. For the reaction $A_{(g)} + 2B_{(g)} \rightleftharpoons C_{(g)}$ the value of $K_C = 50$. If the rate constant of forward reaction is 0.05 then what is the rate constant of backward reaction ?

(a) $\frac{1}{50}$

(b) $\frac{1}{0.05}$

(c) $\frac{50}{0.05}$

(d) $\frac{0.05}{50}$

91. Identify the non-narcotic analgesic drug?

(a) Morphine

(b) Valium

(c) Codeine

(d) Aspirin

92. Which law of thermodynamics introduces the concept of entropy ?

(a) First law

(b) Zeroth law

(c) Third law

(d) Second law

93. The respective examples of extensive and intensive properties are

(a) Enthalpy, Entropy

(b) Entropy, Enthalpy

(c) Entropy, Temperature

(d) Temperature, Entropy

94. The reagents, NH_4Cl and aqueous NH_3 will precipitate

(a) Ca^{2+} (b) Al^{3+}

(c) Mg^{2+} (d) Zn^{2+}

95. The equilibrium constant expression for a gas reaction is, $K_C = \frac{[NH_3]^4[O_2]^5}{[NO]^4[H_2O]^6}$. The balanced chemical equation corresponding to this expression is.

(a) $4NO(g) + 6H_2O(g) \rightleftharpoons 4NH_3(g) + 5O_2(g)$

(b) $4NH_3(g) + 5O_2(g) \rightleftharpoons 4NO(g) + 6H_2O(g)$

(c) both of above

(d) none of these

96. Total number of σ and π-bonds are in naphthalene is

(a) 5π and 18σ

(b) 6π and 19σ

(c) 5π and 19σ

(d) 7π and 26σ

97. Number of water molecules in washing soda and soda ash respectively are:

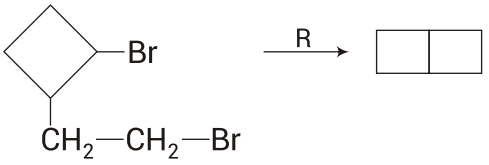
(a) 10 and 1

(b) 1 and 10

(c) 1 and 0

(d) 10 and 0

98.



The reagent R is

(a) NH_3

(b) H_2O

(c) KCN

(d) Na/ether

99. Order of covalent bond:

A. KF > KI; LiF > KF

B. KF < KI; LiF > KF

C. $SnCl_4 > SnCl_2$; CuCl > NaCl

D. LiF > KF; CuCl < NaCl

E. KF < KI; CuCl > NaCl

Choose the correct answer from the options given below:

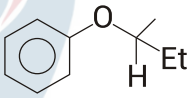
(a) B, C only

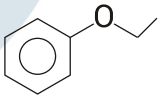
(b) C, E only

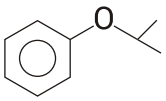
(c) B, C, E only

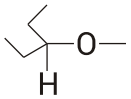
(d) A, B only

100. Which one is optically active aromatic ether?

(a) 

(b) 

(c) 

(d) 

101. Order of basicity of ethyl amines in aqueous phase is

(a) Secondary > Primary > Tertiary

(b) Primary > Secondary > Tertiary

(c) Secondary > Tertiary > Primary

(d) Tertiary > Primary > Secondary

102. Fill in the blanks by choosing the correct option.
Order of the reaction is the $\underline{X}$ of the powers to which concentration terms are raised in experimentally determined rate equation. The unit of first order rate constant is$\underline{Y}$. The unit of first order rate constant when concentration is measured in terms of pressure and time in minutes is $\underline{Z}$.

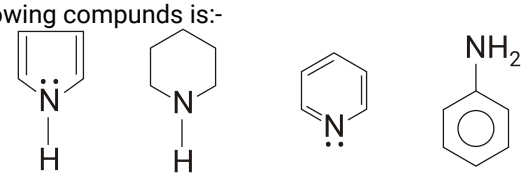
(a) X → product, Y → mol L^{-1} $time^{-1}$, Z → atm min^{-1}

(b) X → sum, Y → L^{-1} mol $time^{-1}$, Z → atm min^{-1}

(c) X → product, Y → L mol^{-1}, Z → atm min^{-1}

(d) X → sum, Y → $time^{-1}$, Z → min^{-1}

103. Correct decreasing order of basic strength for the following compunds is:-



(I) (II) (III) (IV)

(a) I > II > III > IV

(b) II > III > I > IV

(c) II > IV > I > III

(d) II > III > IV > I

104. The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm^{-1} cm^{-1} and the resistance of the cell ontaining the solution at 25°C is 60 ohm. The value of cell constant is

(a) 3.28 cm^{-1}

(b) 1.26 cm^{-1}

(c) 3.34 cm^{-1}

(d) 1.34 cm^{-1}

105. For Rb(Z = 37), the number of electrons present in L and N shells respectively are -

(a) 8 and 18

(b) 18 and 8

(c) 8 and 8

(d) 2 and 8

106. Which of the following is true about the complex $[PtCl_2(H_2O)(NH_3)]$?

(a) It exhibits geometrical isomerism.

(b) It is paramagnetic complex.

(c) Its geometry is tetrahedron.

(d) Platinum is sp^3 hybridised.

107. CrO_3 is red or orange in color. The nature of oxide is:-

(a) Acidic

(b) Basic

(c) Amphoteric

(d) Neutral

108. Correct order of boiling point of group 16 hydrides

(a) $H_2O < H_2S < H_2Se < H_2Te$

(b) $H_2Te < H_2Se < H_2S < H_2O$

(c) $H_2S < H_2Se < H_2Te < H_2O$

(d) $H_2O < H_2Te < H_2Se < H_2S$

109. Match List-I with List-II.

List I (Hydrides)		List II (Nature)	
(A)	MgH_2	(i)	Electron precise
(B)	GeH_4	(ii)	Electron deficient
(C)	B_2H_6	(iii)	Electron rich
(D)	HF	(iv)	Ionic

Choose the correct answer from the options given below

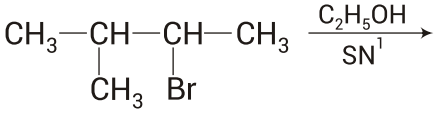
(a) (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

(b) (a) → (iv), (b) → (i), (c) → (ii), (d) → (iii)

(c) (a) → (iii), (b) → (i), (c) → (ii), (d) → (iv)

(d) (a) → (i), (b) → (ii), (c) → (iv), (d) → (iii)

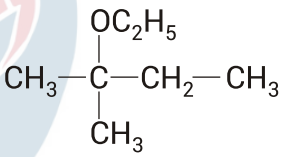
110.



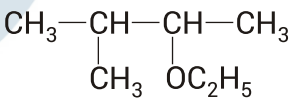
Ether (Major)

The Ether produced is:

(a)



(b)



(c) Both correct

(d) None is correct

111. In a close packed array of N spheres, the number of tetrahedral holes are-

(a) $\frac{N}{2}$

(b) 4N

(c) 2N

(d) N

112. Compound with same molecular formula but different structural formula are called

(a) Isomers

(b) Isotopes

(c) Isobars

(d) Isoelectric

113. C_7H_9N has how many isomeric forms that contain a benzene ring?

(a) 4 (b) 5 (c) 6 (d) 7

114. Ethylidene dibromide is:

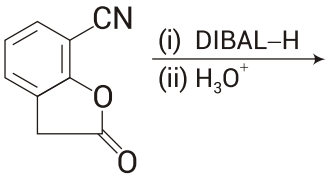
(a) $CH_3 - CH_2 - Br$

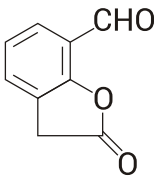
(b) $Br - CH_2 - CH_2 - Br$

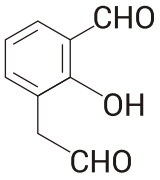
(c) $CH_3 - CHBr_2$

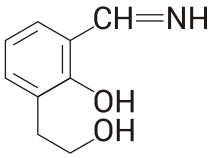
(d) $CH_2 = CBr_2$

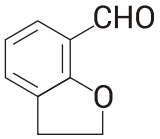
115. The major product of the following reaction



(a) 

(b) 

(c) 

(d) 

116. Sugar which does not give reddish brown precipitate with Fehling?s reagent is:

(a) Sucrose

(b) Lactose

(c) Glucose

(d) Maltose

117. IUPAC name of $H_2[PtCl_6]$ is

(a) Dihydrogen hexachloridoplatinum (IV)

(b) Hexachloridoplatinic (IV) acid

(c) Dihydrogen hexachloridoplatinic (IV) acid

(d) Hexachloridoplatinum (IV) acid

118. The alloy used in the construction of aircrafts is:

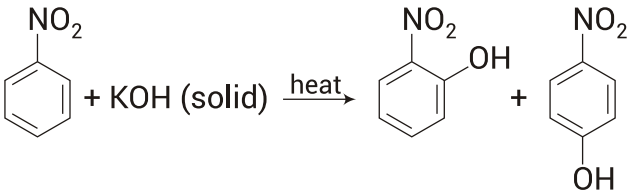
(a) Mg - Zn

(b) Mg - Sn

(c) Mg - Mn

(d) Mg - Al

119. The following reaction is



(a) Nucleophilic substitution

(b) Electrophilic substitution

(c) Free radical substitution

(d) None of these

120. Which of the following is an essential amino acid?

(a) Serine

(b) Cysteine

(c) Glycine

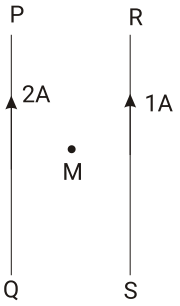
(d) Phenylalanine

Part - C Physics

Section - I: Single Correct

This section contains a total of 40 questions.
All questions in this section are mandatory.
For every correct response you shall be awarded 1 marks.
For every incorrect response 0 marks shall be deducted.

121. PQ and RS are long parallel conductors separated by a certain distance. M is a point equidistant from both wires and in the same plane as the wires (see the figure). The net magnetic field at M is $\vec{B}$. Now, the current 2 A is switched off. The field at M now becomes



(a) $2\vec{B}$

(b) $\vec{B}$

(c) $-\vec{B}$

(d) $3\vec{B}$

122. Which of the following pairs is dimensionally correct?

(a) Pressure, Force per unit volume

(b) Pressure, Momentum per unit volume per unit time

(c) Pressure, Energy per unit volume

(d) Pressure, Energy per unit volume per unit time

123. Two coils are made of copper wires of the same length. In the first coil, the number of turns is 3 n and the radius is r. In the second coil, the number of turns is n and the radius is 3 r. The ratio of the self- inductances of the coils will be

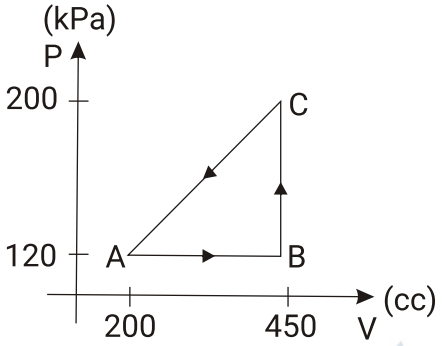
(a) $3:1$

(b) $1:3$

(c) $9:1$

(d) $1:9$

124. Calculate the work done by the gas in the state diagram shown.



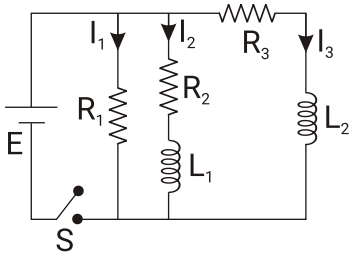
(a) 30 J

(b) 20 J

(c) −20 J

(d) −10 J

125. Figure shows an L-R circuit. When the switch S is closed, the current through resistor R_1, R_2 and R_3 are I_1, I_2 and I_3 respectively. The value of I_1, I_2 and I_3 at $t = 0$ $s$is



(a) $I_1 = I_2 = I_3 = 0$

(b) $I_1 = \frac{E}{R_1}, I_2 = I_3 = 0$

(c) $I_1 = 0, I_2 = \frac{E}{R_2}, I_3 = \frac{E}{R_3}$

(d) $I_1 = \frac{E}{R_1}, I_2 = \frac{E}{R_2 + L_1}, I_3 = \frac{E}{R_3 + L_3}$

126. Two forces having magnitude A and $\frac{A}{2}$ are perpendicular to each other. The magnitude of their resultant is:

(a) $\frac{\sqrt{5}A}{4}$

(b) $\frac{5A}{4}$

(c) $\frac{\sqrt{5}A^2}{4}$

(d) $\frac{\sqrt{5}A}{2}$

127. A force defined by$F = \alpha t^2 + \beta t$ acts on a particle at a given time t. The factor which is dimensionless, ifα and β are constants, is :

(a) $\frac{\beta t}{\alpha}$

(b) $\frac{\alpha t}{\beta}$

(c) $\alpha\beta t$

(d) $\frac{\alpha\beta}{t}$

128. For a material, μ_r = 0.9 and $\in_r$ = 4.9 . What is the refractive index of material?

(a) 0.47 (b) 2.1

(c) 4.41 (d) 1.6

129. If the degrees of freedom of a gas molecule be f, then the ratio of two specific heats $\frac{C_p}{C_v}$ is given by:

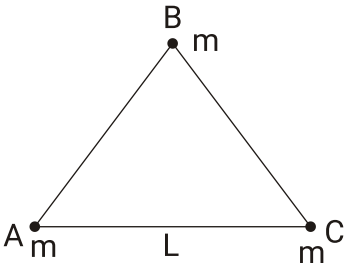
(a) $\frac{2}{f} + 1$

(b) $1 - \frac{2}{f}$

(c) $1 + \frac{1}{f}$

(d) $1 - \frac{1}{f}$

130. Three particles, each of mass m are situated at the vertices of an equilateral triangle ABC of side L. Find the MOI of the system about one of the sides of the triangle ABC.



(a) $\frac{mL^2}{2}$

(b) $\frac{4mL^2}{7}$

(c) $\frac{8mL^2}{7}$

(d) $\frac{3mL^2}{4}$

131. In the product, $\vec{F} = q(\vec{v} \times \vec{B}) = q\vec{v} \times (B\hat{i} + B\hat{j} + B_0\hat{k})$, for $q = 1$ and $\vec{v} = 2\hat{i} + 4\hat{j} + 6\hat{k}$ and $\vec{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$. What will be the complete expression for $\vec{B}$?

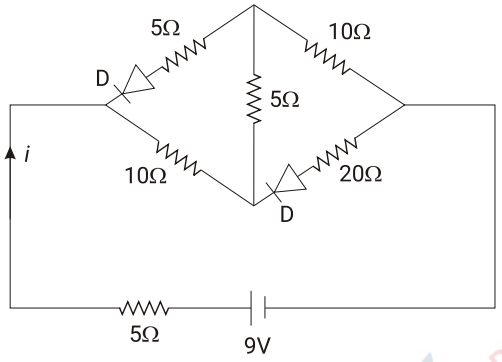
(a) $8\hat{i} + 8\hat{j} - 6\hat{k}$

(b) $6\hat{i} + 6\hat{j} - 8\hat{k}$

(c) $-8\hat{i} - 8\hat{j} - 6\hat{k}$

(d) $-6\hat{i} - 6\hat{j} - 8\hat{k}$

132. Find out the current i in the network?



(a) 0.2A (b) 0.3A

(c) 0A (d) 0.6A

133. **Statement I**: Energy dissipated against friction depends on the path followed.
Statement II: Friction force is non-conservative force.

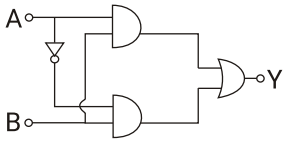
(a) Statement I and Statement II are true and the Statement II is the correct explanation of Statement I.

(b) Statement I and Statement II are true but the Statement II is not the correct explanation of Statement I.

(c) Statement I is true but Statement II is false.

(d) Statement I and Statement II are false.

134. The truth table for this given circuit is:



(a)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(b)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

(c)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(d)

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	1

135. A solid cylinder and a solid sphere, having the same mass M, and radius R, roll down the same inclined plane from top without slipping. They start from rest. The ratio of the velocity of the solid cylinder to that of the solid sphere when they reach the ground, will be:

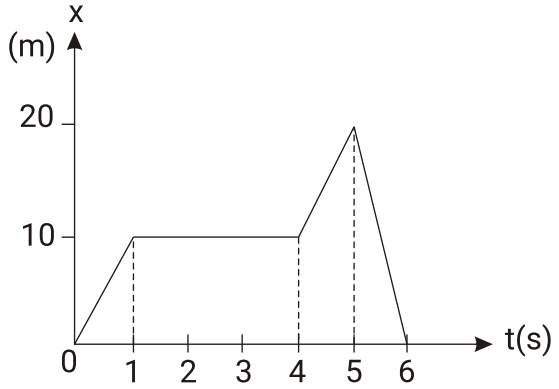
(a) $\sqrt{\frac{5}{3}}$

(b) $\sqrt{\frac{4}{5}}$

(c) $\sqrt{\frac{3}{5}}$

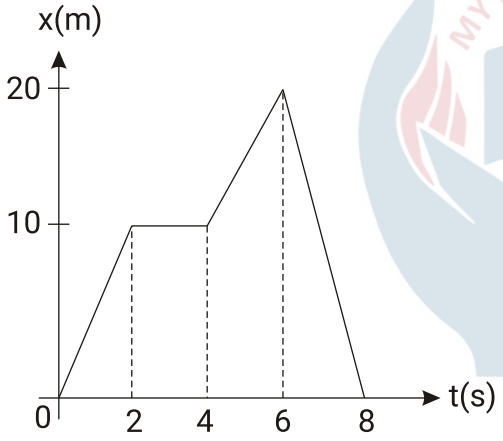
(d) $\sqrt{\frac{14}{15}}$

136. The figure shows the graph of the x-coordinate of a particle moving along the x-axis as a function of time. Average velocity during t = 0 to 6 s and instantaneous velocity at t = 3 s respectively, will be



(a) 10 m/s, 0
(b) 60 m/s, 0
(c) 0, 0
(d) 0, 10 m/s

137. The position (x)-time (t) graph for a particle moving along a straight line is shown in figure. The average speed of particle in time interval t = 0 to t = 8 s is



(a) Zero
(b) 5 m/s
(c) 7.5 m/s
(d) 9.7 m/s

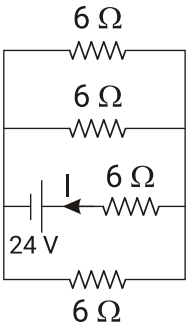
138. What will be the average value of energy of a monoatomic gas molecule in thermal equilibrium at temperature T ?

(a) $\frac{3}{2}\mathrm{k_B T}$
(b) $\mathrm{k_B T}$
(c) $\frac{2}{3}\mathrm{k_B T}$
(d) $\frac{1}{2}\mathrm{k_B T}$

139. Two particles of mass 1 kg and 0.5 kg are moving in the same direction with speed of 2 m/s and 6 m/s respectively on a smooth horizontal surface. The speed of centre of mass of the system is :

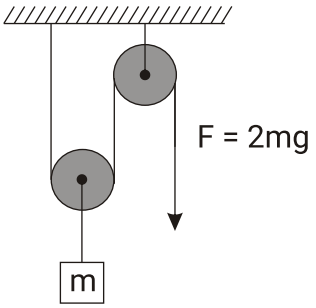
(a) $\frac{10}{3}$ m/s
(b) $\frac{10}{7}$ m/s
(c) $\frac{11}{2}$ m/s
(d) $\frac{12}{3}$ m/s

140. Current I in the network shown in figure is



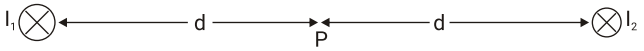
(a) 16 A
(b) 3 A
(c) 4 A
(d) 12 A

141. In the shown mass pulley system, pulleys and string are massless. The one end of the string is pulled by the force F = 2mg.
The acceleration of the block will be:



(a) $\frac{\mathrm{g}}{2}$
(b) 0
(c) g
(d) $3\mathrm{g}$

142. Following figure represents two infinite straight conductors carrying currents I_1 and I_2 perpendicular to the plane of paper. What is the magnitude and direction of magnetic field at point *P*?



(a) $\frac{\mu_0(I_1+I_2)}{2\pi d}$, in downward direction.

(b) $\frac{\mu_0(I_1 - I_2)}{2\pi d}$, in upward direction

(c) $\frac{\mu_0(I_1 + I_2)}{2\pi d}$, in upward direction

(d) $\frac{\mu_0(I_2 - I_1)}{2\pi d}$, in upward direction

143. The time taken by an object to slide down a 45° rough inclined plane is n times as it takes to slide down a perfectly smooth 45° inclined plane. The coefficient of kinetic friction between the object and the inclined plane is:

(a) $1 - \frac{1}{\mathrm{n}^2}$

(b) $\sqrt{1 - \frac{1}{\mathrm{n}^2}}$

(c) $\sqrt{\frac{1}{1 - \mathrm{n}^2}}$

(d) $1 + \frac{1}{\mathrm{n}^2}$

144. The total charge on the system of capacitance $\mathrm{C}_1 = 1\mu\mathrm{F}$, $\mathrm{C}_2 = 2\mu\mathrm{F}$, $\mathrm{C}_3 = 4\mu\mathrm{F}$ and $\mathrm{C}_4 = 3\mu\mathrm{F}$ connected in parallel is
(Assume a battery of 20V is connected to the combination)

(a) $200\mu\mathrm{C}$

(b) 200 C

(c) $10\mu\mathrm{C}$

(d) 10 C

145. At what height above the surface of earth the value of "g" decreases by 2%? [radius of the earth is 6400 km]

(a) 32 km

(b) 64 km

(c) 128 km

(d) 1600 km

146. The equation of a progressive wave for a wire is: $\mathrm{Y} = 4\sin\left[\frac{\pi}{2}\left(8\mathrm{t} - \frac{\mathrm{x}}{4}\right)\right]$. If x and y are measured in cm, then velocity of the wave is

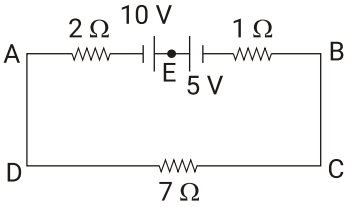
(a) 64 cm/s along $-\mathrm{x}$ direction

(b) 32 cm/s along $-\mathrm{x}$ direction

(c) 32 cm/s along $+\mathrm{x}$ direction

(d) 64 cm/s along $+\mathrm{x}$ direction

147. The magnitude and direction of the current in the following circuit is:-



(a) 0.5 A from A to B through E

(b) $\frac{5}{9}$ A from A to B through E

(c) 1.5 A from B to$\mathrm{A}$ through E

(d) 0.2 A from B to A through E

148. The current in a conductor varies with time t as I = 2t + $3t^2$ A where I is in amperes and t in seconds. The electric charge flowing through a section of the conductor during t = 2 s to t = 3 s is

(a) 10 C (b) 24 C

(c) 33 C (d) 44 C

149. In an A.C. circuit, a capacitance of 5 μF has a reactance of $1000\ \Omega$. The frequency of A.C. will be:

(a) $\frac{1000}{\pi}$ cycles/s

(b) $\frac{100}{\pi}$ cycles/s

(c) 200 cycles/s

(d) 5000 cycles/s

150. A transverse wave represented by $y = 0.02sin(x + 30t)$, (where x and t are in metres and seconds) is travelling along a wire of cross-sectional area 1 mm^2 and density 8000 kg/m^3. Tension in the string is

(a) 20 N

(b) 7.2 N

(c) 30 N

(d) 14.4 N

151. Match List-I with List-II :

	List-I		List-II
(a)	Isothermal	(i)	Pressure constant
(b)	Isochoric	(ii)	Temperature constant
(c)	Adiabatic	(iii)	Volume constant
(d)	Isobaric	(iv)	Heat content is constant

Choose the correct answer from the options given below :

(a) (a) → (i), (b) → (iii), (c) → (ii), (d) → (iv)

(b) (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

(c) (a) → (ii), (b) → (iv), (c) → (iii), (d) → (i)

(d) (a) → (iii), (b) → (ii), (c) → (i), (d) → (iv)

152. The angle between the electric lines of force and an equipotential surface is:

(a) $45°$

(b) $90°$

(c) $180°$

(d) $0°$

153. The length of a simple pendulum executing simple harmonic motion is increased by 21%. Find out percentage increase in the time period of pendulum of increased length? $(T = 2\pi\sqrt{\ell/g})$

(a) 11% (b) 21%

(c) 42% (d) 10%

154. A ring and disc roll down an identical inclined plane from same height. The ratio of time taken by them to reach bottom of the inclined plane is :-

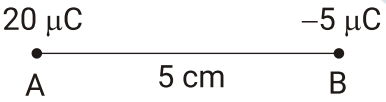
(a) $\sqrt{\frac{3}{4}}$

(b) $\sqrt{\frac{4}{3}}$

(c) $\sqrt{\frac{2}{3}}$

(d) $\sqrt{\frac{1}{3}}$

155. Two particles A and B having charges 20 μC and −5 μC respectively are held fixed with a separation of 5 cm. At what position a third charged particle should be placed so that it does not experience a net electric force?



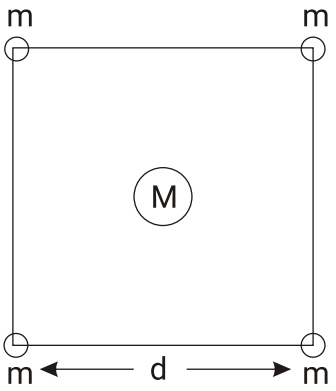
(a) At 5 cm from 20 μC on the left side of it

(b) At 5 cm from −5 μC on the right side of it

(c) At 1.25 cm from −5 μC between two charges

(d) At midpoint between two charges

156. Four spheres each of mass m form a square of side d (as shown in figure). A fifth sphere of mass M is situated at the centre of square. The total gravitational potential energy of the system is:



(a) $-\frac{Gm}{d}[(4+\sqrt{2})m + 4\sqrt{2}M]$

(b) $-\frac{Gm}{d}[(4+\sqrt{2})M + 4\sqrt{2}m]$

(c) $-\frac{Gm}{d}[3m^2 + 4\sqrt{2}M]$

(d) $-\frac{Gm}{d}[6m^2 + 4\sqrt{2}M]$

157. A particle is executing S.H.M. If its amplitude is 2 m and periodic time 2 seconds, then the maximum velocity of the particle will be

(a) π m/s

(b) $\sqrt{2\pi}$ m/s

(c) 2π m/s

(d) 4π m/s

158. A boat is sailing with a velocity $(3\hat{i} + 4\hat{j})$ with respect to the ground and water in the river is flowing with a velocity $(-6\hat{i} - 8\hat{j})$. The relative velocity of the boat with respect to water is:

(a) $8\hat{j}$

(b) $9\hat{i} + 12\hat{j}$

(c) $6\hat{i} + 8\hat{j}$

(d) $-6\hat{i} - 8\hat{j}$

159. Using Bohr's formula for energy quantization, the ionisation potential of the ground state of Li^{++} atoms is

(a) 122 V

(b) 13.6 V

(c) 3.4 V

(d) 10.2 V

160. The dimensional formula of latent heat is:

(a) $[M^0LT^{-2}]$

(b) $[MLT^{-2}]$

(c) $[M^0L^2T^{-2}]$

(d) $[ML^2T^{-2}]$