RB IIT Academy EAMCET ENG MOCK TEST 2

1) The domain of $f(x) = Cot(2x - 4)$ is

A) $R - \{n\pi : n \in N\}$ B) $R - \left\{\frac{n\pi+4}{2};\ n \in Z\right\}$ C) $R - \left\{\frac{n\pi}{5};\ n \in Z\right\}$ D) $R - \left\{(2n+1)\frac{\pi}{10};\ n \in Z\right\}$

2) The range of $x^2 + 4y^2 + 9z^2 - 6yz - 3xz - 2xy$

A) ϕ B) R C) $[0, \infty)$ D) $(-\infty, 0)$

3) The points with vectors $60\bar{i} + 3\bar{j}, 40\bar{i} - 8\bar{j}\ \ and\ \ a\bar{i} - 52\bar{j}$ are collinear, if $'a' =$

A) -40 B) 40 C) 20 D) 30

4) If A = $\bar{a}$ and B = $\bar{b}, C = 2\bar{a} - 4\bar{b}$ then

A) C lies outside ΔOAB but inside exterior angular region of $\angle OBA$.

B) C lies outside ΔOAB but inside $\angle OAB$. C) C lies outside ΔOAB but inside $\angle AOB$.

D) C lies inside ΔOAB but outside $\angle ABO$.

5) A vector has components $2p$ and 1 w.r.t. a rectangular cartesian system.This system is roatated through a certain angle about the origin in the counter -clockwise with respect to the new system, if has components $p + 1$ and 1 then

A) $p = 0$ B) $p = 1$ or $p = -\frac{1}{3}$ C) $p = -1$ or $p = \frac{1}{3}$ D) $p = 1$ or $p = -1$

6) If $7\bar{a} + 3\bar{b} - 10\bar{c} = \bar{0}$, then the vectors $\bar{a},\ \bar{b},\ \bar{c}$ are

A)Non-collinear and Non-coplanar B)Non-coplanar C)Coplanar D)Collinear

7) If $2\bar{i} + 3\bar{j} + 5\bar{k}$, $2\bar{i} + 4\bar{j} + 5\bar{k}$ and $2\bar{i} + 4\bar{j} + 7\bar{k}$ are the vertices of a triangle, then its circumcentre is

A) $2\bar{i} + \frac{11}{3}\bar{j} + \frac{17}{3}\bar{k}$ B) $2\bar{i} + \frac{7}{2}\bar{j} + 6\bar{k}$ C) $6\bar{i} + 15\bar{j} + 17\bar{k}$ D) $2\bar{i} - 16\bar{j} + 18\bar{k}$

8) Combined equation of pair of lines passing through origin and inclined at 30^0 and 60^0 respectively with x - axis is

A) $\sqrt{3}y^2 - x^2 = 0$ B) $y^2 - \sqrt{3}x^2 = 0$ C) $\sqrt{3}y^2 + 4xy - \sqrt{3}x^2 = 0$
D) $\sqrt{3}y^2 - 4xy + \sqrt{3}x^2 = 0$

9) ΔABC is not a right angled and is inscribed in a fixed circle . If a A,b,B be slightly varied keeping c, C fixed then $\frac{\delta a}{\cos A} + \frac{\delta b}{cosB} =$.

A) 2 B) 1 C) 0 D) 5

10) If A is a 3 x 3 skew-symmetric matrix, then trace of A is equal to

A) -1 B) 1 C) $|A|$ D) 0

11) If the entries in a 3×3 determinant are either 0 or 1, then the greatest value of their determinats is

A) 1 B) 2 C) 3 D) 9

12) A man is walking at the rate of 8 kmph towards the foot of the tower 60 mts high .The rate at which he approaches the top of the tower when he is 80 mts. from the foot of the tower is

A) 3.2 kmph B) 4.8 kmph C) 6.4 kmph D) 2.3 kmph

13) The slope of the tangent to the curve $x = t^2 + 3t - 8, y = 2t^2 - 2t - 5$ at the point $(2, -1)$ is

A) $\frac{22}{7}$ B) $\frac{6}{7}$ C) 6 D) -6

14) The angle between the planes $2x - y + z = 6 \, and \, x + y + 2z = 7$ is

A) 30^0 B) 60^0 C) 45^0 D) 90^o

15) If (ℓ_1, m_1, n_1), (ℓ_2, m_2, n_2) are dc's of two lines then
$(\ell_1 m_2 - \ell_2 m_1)^2 + (m_1 n_2 - m_2 n_1)^2 + (n_1 \ell_2 - n_2 \ell_1)^2 + (\ell_1 \ell_2 + m_1 m_2 + n_1 n_2)^2$

A) 0 B) 1 C) 2 D) 4

16) If α, β, γ are the roots of $x^3 + px^2 + qx + r = 0$ then$(\alpha + \beta)(\beta + \gamma)(\gamma + \alpha) =$

A) pq-r B) r-pq C) p + pqr D) pq + r

17) The value of $\frac{\theta}{2}$ in the lagranges mean value theorem for $f(x) = x^3, a = 1, h = \frac{1}{2}$ is

A) $\frac{1}{3}$ B) $\sqrt{\frac{19}{56}}$ C) $\sqrt{\frac{19}{24}} - 1$ D) $\sqrt{\frac{19}{3}} - 2$

18) If $tanxcoth(\frac{x}{2}) = 1$ then Cos2xCoshx =

A) 1 B) 2 C) 0 D) -1

19) In a triangle ABC $a = 5, b = 4$ and $Tan\frac{C}{2} = \sqrt{\frac{7}{9}}$ then c=

A) 6 B) 3 C) 2 D) 5

20) If $|z_1| = 2, |z_2 = 3, |z_3| = 4$ and $|z_1 + z_2 + z_3| = 5$ then $|4z_2z_3 + 9z_3z_1 + 16z_1z_2|$ =

A) 20 B) 24 C) 48 D) 120

21) If $1, \alpha_1, \alpha_2 \ldots\ldots \alpha_{n-1}$ are the nth roots of unity. The value of $(3 - \alpha)(3 - \alpha^2) \ldots . (3 - \alpha^{n-1})$ is

A) n B) 0 C) $\frac{(3^n - 1)}{2}$ D) $\frac{(3^n + 1)}{2}$

22) One value of $(1 + i)^{\frac{1}{2}}\ is\ 2^{\frac{1}{4}}e^{\frac{i\pi}{8}}$ .Then other value is

A) $2^{1/4}e^{-i(\pi/8)}$ B) $2^{1/4}e^{i(5\pi/8)}$ C) $2^{1/4}e^{-i(5\pi/8)}$ D) $2^{1/4}.e^{+i(9\pi/8)}$

23) If the ratio of the roots of $ax^2 + bx + c = 0$ is m : then $\frac{b^2}{ac} =$

A) $\frac{(m+n)^2}{mn}$ B) $\frac{m+n}{mn}$ C) $\frac{mn}{(m+n)^2}$ D) $\frac{mn}{(m+n)}$

24) If the roots of $4x^3 - 12x^2 + 11x + k = 0$ are in A.P. then K =

A)-3 B)1 C)2 D)3

25) If $\left(x^2 - x + 1\right)$ is a factor of $f(x) = ax^3 + bx^2 + cx + d$ where and a,b,c,d are real, then the real root of $f(x) = 0$ is

A) $\frac{a}{d}$ B) $\frac{d}{a}$ C) $\frac{-a}{d}$ D) $\frac{-d}{a}$

26) If $-2, 5, 7, -11$ are the roots of $ax^4 + bx^3 + cx^2 + dx + e = 0$ then the roots of $ax^4 - bx^3 + cx^{^2} - dx + e = 0$ are

A) 2,5,7,11 B) 2,-5,-7,11 C) 2,5,-7,-11 D) -2,5,7,11

27) The equation of the image of the circle $x^2 + y^2 - 6x - 4y + 12 = 0$ by the line mirror $x + y - 1 = 0$.

A) $x^2 + y^2 + 2x + 4y + 4 = 0$ B) $x^2 + y^2 - 2x + 4y + 4 = 0$

C) $x^2 + y^2 + 2x + 4y - 4 = 0$ D) $x^2 + y^2 + 2x - 4y + 4 = 0$

28) The equation of a circle with centre $(4, 1)$ and having $3x + 4y - 1 = 0$ as tangent is

A) $x^2 + y^2 - 8x - 2y - 8 = 0$ B) $x^2 + y^2 - 8x - 2y + 8 = 0$

C) $x^2 + y^2 - 8x + 2y + 8 = 0$ D) $x^2 + y^2 - 8x - 2y + 4 = 0$

29) The sum of all four digited numbers that can be formed using the digits 0, 2, 4, 7, 8 without repetition is

A) 479952 B) 497952 C) 545958 D) 547598

30) The sum of the digits at the ten's place of all the numbers formed with the help of 3, 4, 5, 6 taken all at a time is

A) 432 B) 108 C) 136 D) 180

31) A and B are two independent events. The probability that both A and B occur is $\frac{1}{6}$ and the probability that neither of them occur is $\frac{1}{3}$. The probability of occurence of A is

A) $\frac{1}{4}, \frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{3}, \frac{1}{2}$ D) $\frac{1}{4}$

32) A and B alternately cut a card each from a pack of cards with replacement and pack is shuffled after each cut. If A starts the game and the game is continued till one cuts a spade, the respective probabilities of A and B cutting a spade are

A) $\frac{1}{3}, \frac{2}{3}$ B) $\frac{3}{4}, \frac{1}{4}$ C) $\frac{4}{7}, \frac{3}{7}$ D) $\frac{3}{7}, \frac{4}{7}$

33) If $I_n = \int \frac{\sin\ nx}{\sin\ x}\, dx\ (n > 1)$ then $I_{n+1} - I_{n-1}$

A) $\frac{2}{n-1} \cos\ (n-1)\, x$ B) $\frac{2}{n-1} \sin\ (n-1)\, x$ C) $\frac{2}{n} \cos\ n\, x$ D) $\frac{2}{n} \sin\ n\, x$

34) $\int_0^{50} (x - [x])dx$

A) 25 B) 20 C) 15 D) 10

35) $\int_8^9 \sqrt{\frac{x-8}{9-x}}dx$

A) π B) $\frac{\pi}{3}$ C) $\frac{\pi}{2}$ D) $\frac{\pi}{6\sqrt{2}}$

36) $\int_1^5 \frac{1}{\sqrt{(x-1)(5-x)}}\, dx$

A) $\frac{\pi}{2}$ B) π C) $\frac{\pi}{4}$ D) $\frac{-\pi}{2}$

37) Area of the region bounded by $y = |x|\ and\, y = 1 - |x|$ is

A) $\frac{1}{3}$ B) 1 C) $\frac{1}{2}$ D) 2

38) The Differential equation of all non-vertical lines in a plane is

A) $\frac{d^2y}{dx^2}=0$ B) $\frac{d^2x}{dy^2}=0$ C) $\frac{dy}{dx}=0$ D) $\frac{dx}{dy}=0$

39) The order, degree of the D.E whose solution is ,$Ax^2+By^2=1$ where A, B are arbitrary constants , are

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

40) $Cos^{-1}\left\{\frac{1}{\sqrt{2}}\left(Cos\frac{9\pi}{10}-Sin\frac{9\pi}{10}\right)\right\}=$

A) $\frac{3\pi}{20}$ B) $\frac{7\pi}{10}$ C) $\frac{7\pi}{20}$ D) $\frac{17\pi}{20}$

41) AB is a focal chord of the parabola . If $A=(4a,4a)$ then B =

A) $(\frac{a}{2},\frac{-a}{4})$ B) $(\frac{a}{4},-a)$ C) $(\frac{a}{2},\frac{-a}{2})$ D) $(\frac{a}{4},-4a)$

42) If $(-4,1),(6,1)$are the vertices of an Ellipse and one of the foci lies on x-2y = 2 then the eccentricity is

A) $\frac{3}{5}$ B) $\frac{4}{5}$ C) $\frac{2}{5}$ D) $\frac{1}{5}$

43) If angle between the asymptotes of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is 45^o , then value of ecentricity e is

A) $\sqrt{4\pm2\sqrt{2}}$ B) $\sqrt{4+2\sqrt{2}}$ C) $\sqrt{4-2\sqrt{2}}$ D) $\sqrt{4-3\sqrt{2}}$

44) A tree is broken by wind, its upper part touches the ground at a point 10 meters from the foot of the tree and makes an angle of 45^o with the ground. The entire length of the tree is

A) 15 mt B) 20 mt C) $10(1+\sqrt{2})$ mt D) $10\left(1+\frac{\sqrt{3}}{2}\right)$ mt

45) $\lim_{x\to 0}\left[\frac{16^x+9^x}{2}\right]^{\frac{1}{x}} =$

A) 1 B) 12 C) $\frac{25}{2}$ D) 144

46) $\lim_{x\to 0}\left[\frac{\sin(\text{sgn}(x))}{(\text{sgn}(x))}\right]$ where [ ]denotes the greatest integer function, is equal to

A) 0 B) 1 C) -1 D) Does not exist

47) If $\lim_{n\to\infty}\frac{n.3^n}{n(x-2)^n+n.3^{n+1}-3^n}=\frac{1}{3}, n\in N$ then the range of x' is

A) $[2,5)$ B) $(1,5)$ C) $(-1,5)$ D) $(-\infty,\infty)$

48) $y=\sin(\sin x)\Rightarrow y_2+y_1 tanx=$

A)$-y\cos^2 x$ B)$y\cos^2 x$ C)$-y\sin^2 x$ D)$y\sin^2 x$

49) If $x=a\cos^4 t, y=b\sin^4 t$ then $\frac{dy}{dx}$ at $t=\frac{3\pi}{4}$ is

A)$-\frac{b}{a}$ B)$\frac{b}{a}$ C)$-\frac{a}{b}$ D) $\frac{a}{b}$

50) $f(x)=(1+x)^{\frac{5}{x}},\ x\neq 0, f(0)=e^5$ at $x=0$, f is

A) continuous B) discontinuous C) not determined D) none

51) If the mean of a Binomial Distribution is 25, then standard deviation lies in the interval

A) $[0,\ 5)$ B) $[0,\ 25)$ C) $(0,\ 5]$ D) $(0,\ 5)$

52) If $Cos(\frac{x}{2})Cos(\frac{x}{2^2})\cos(\frac{x}{2^3})\ ...\infty=\frac{\sin x}{x}$ then
$\frac{1}{2}\tan\frac{x}{2}+\frac{1}{2^2}\tan\left(\frac{x}{2^2}\right)+\frac{1}{2^3}\tan\left(\frac{x}{2^3}\right)+---\infty=$ _____

A) $\frac{x\cot x-1}{x}$ B) $\cot x$ C) $\frac{x\tan x-1}{x}$ D) $\frac{1-x\cot x}{x}$

53) $A=\begin{pmatrix} n & 1 \\ 1 & 0 \end{pmatrix}$ and A^2 is an identity then $n=$

A) 1 B) -1 C) 0 D) 2

54) If $\Delta=\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}=5$

then the value of $\begin{vmatrix} b_2c_3-b_3c_2 & a_3c_2-a_2c_3 & a_2b_3-a_3b_2 \\ b_3c_1-b_1c_3 & a_1c_3-a_3c_1 & a_3b_1-a_1b_3 \\ b_1c_2-b_2c_1 & a_2c_1-a_1c_2 & a_1b_2-a_2b_1 \end{vmatrix}$

A) 5 B) 10 C) 20 D) 25

55) The angle between the asymptotes of the hyperbola $3x^2-y^2=3$ is

A) $\frac{\pi}{6}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{3}$ D) $\frac{2\pi}{3}$

56) A fair die is rolled 180 times. The expected number of six's is

A) 50 B) 30 C) 10 D) 5

57) If $f(x)=x^2+x+1$ where$x=2, \delta x=0.01$ then $\delta f=$

A) 0.0501 B) 0.05 C) 0.005 D) 0.0051

58) The first negative term in the expansion of $(1+x)^{\frac{3}{4}}$ is if x is positive.

A) T_2 B) T_4 C) T_3 D) T_7

59) A line segment of 2 units is sliding with its ends on two perpendicular lines. Then the locus of the middle point is

A) $x+2y+1=0$ B) $x^2+y^2=1$ C) $y^2=4ax$ D) $x^2=4ay$

60) The number of partial fractions of $\frac{x^3-3x^2+3x}{(x-1)^5}$ is

A) 2 B) 3 C) 4 D) 5

61) The number of partial fractions of $\frac{2}{x^4+x^2+1}$ is

A) 2 B) 3 C) 4 D) 5

62) $C_0+\frac{C_1}{2}x+\frac{C_2}{3}x^2+\ldots..+\frac{C_n}{n+1}x^n=$

A) $\frac{(1+x)^{n+1}-1}{(n+1)x}$ B) $\frac{(1+x)^n-1}{(n+1)x}$ C) $\frac{(1+x)^{n+1}+1}{(n+1)x}$ D) $\frac{(1+x)^{n+2}-1}{(n+1)x}$

63) $\int_{\pi}^{10\pi}|\sin x|\,dx=$

A) 20 B) 8 C) 10 D) 18

64) The solution of $(x+y+1)\frac{dy}{dx}=1$ is

A) $x=-(y+2)+ce^y$ B) $y=-(x+2)+ce^x$ C) $x=-(y+2)+ce^x$
D) $x=(y+2)+ce^{-y}$

65) Sum to '10' terms of series $1+(1+3)+(1+3+5)+\ldots\ldots\ldots$

A) 385 B) 425 C) 445 D) 625

66) If $x\sqrt{1+y}+y\sqrt{1+x}=0$ and $x\neq y$ $then$ $\frac{dy}{dx}=$

A) $\frac{1}{1+x}$ B) $\frac{1}{(1+x)^2}$ C) $\frac{-1}{(1+x)^2}$ D) $\frac{1-x}{(1+x)^2}$

67) Maximum value of $y=1+4\sin^2x\,\cos^2x$

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

68) The maximum value of $\cos^3 A + \cos^3(120^0 - A) + \cos^3(120^0 + A)$ is

A) 0.75 B) 0.25 C) 1.5 D) 2.5

69) 5,7 are the intercepts of plane on the y-axis, z-axis respectively. If the plane is parallel to the x-axis then the equation of the plane is

A) 5y + 7z = 35 B) 7y + 5z = 1 C) $\frac{y}{7} + \frac{z}{5} = 35$ D) 7y + 5z = 35

70) The equation of the plane through the origin and containing the lines whose direction cosines are proportional to $(1, -2, 2)$ and $(2, 3, -1)$ is

A) $x - 2y + 2z = 0$ B) $2x + 3y - z = 0$ C) $x + 5y - 3z = 0$ D) $4x - 5y - 7z = 0$

71) $f(x) = \cos(x^2 - 2[x])$, for $0 < x < 1$, $f^1\left(\frac{\sqrt{\pi}}{2}\right)$= ----------

A) $-\sqrt{\frac{\pi}{2}}$ B) $-\sqrt{\pi}$ C) $\sqrt{\frac{\pi}{2}}$ D) $\sqrt{\pi}$

72) The area enclosed by the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

A) $\pi\, ab$ B) $\frac{\pi\, ab}{4}$ C) 4ab D) 8ab

73) The smaller area between the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$ and the line $\frac{x}{3} + \frac{y}{4} = 1$ is

A) $\pi - 2$ B) $3(\pi - 2)$ C) $3(\pi + 2)$ D) $3(3\pi + 2)$

74) If $sin\theta, cos\theta, tan\theta$ are in G.P. then the value of $cot^6\theta - cot^2\theta =$ is

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

75) If $f(x) = |x-1| + |x-2| + |x-3|$ then $f : [2, 3] \to R$ is

A) One - one but not onto function B) An onto function only C) An identity function

D) Many to one function

76) Two circles of equal radii 'r' cut orthogonally. If their centres are $(-2,-3)$ and $(-5,-6)$ then $r=$

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

77) If 7 points out of 12 are in the same straight line, then the number of triangles formed is

A) 19 B) 158 C) 185 D) 201

78) The length of the common chord of the circles $x^2+y^2+4x+1=0$ and $x^2+y^2+4y-1=0$ is

A) $\sqrt{15/2}$ B) $\sqrt{15}$ C) $2\sqrt{15}$ D) $15\sqrt{2}$

79) If ${}^nc_{r-1}=36,{}^nc_r=84$ and ${}^nc_{r+1}=126$ then

A) $n=8,r=4$ B) $n=9,r=3$ C) $n=7,r=5$ D) $n=8,r=2$

80) The mean or average number of heads when we toss 10 unbiased coins is

A) 20 B) 10 C) 5 D) 15

81) Arrange the increasing order of dimensions of time of the following physcial quantities

A) decay constant

B) Intensity of radiation

C) Permitivity

D) Moment of inertia

A) A,B,D,C B) C,D,B,A C) B,A,D,C D) B,A,C,D

82) The length of a rectangular plate is 10.52 m and its width is only 0.041 m. Find its area up to appropriate significant figures.

A) $0.4305\mathrm{m}^2$ B) $0.43\mathrm{m}^2$ C) $0.4\mathrm{m}^2$ D) $0.043\mathrm{m}^2$

83) A particle is thrown with a speed u at an angle θ with the horizontal. When the particle makes an angle φ with the horizontal its speed changes to 'V' then

A) $V = u\cos\theta\cos\varphi$ B) $V = u\cos\theta\sec\varphi$ C) $V = u\cos\theta$ D) $V = u\cos\theta\sin\varphi$

84) One train is approaching an observer at rest and another is receding him with same velocity 4 m/s. Both the trains blow whistles of same frequency of 243 Hz. The beat frequency in Hz as heard by the observer is: Speed of sound in air =320 m/s.

A) 10 B) 6 C) 4 D) 1

85) Three identical spheres each of radius 'R' are placed touching each other so that their centers A,B,C lie on a straight line.The position of center of mass from centre of mass of 'A' is

A) $\frac{2R}{3}$ B) $2\mathrm{R}$ C) $\frac{5R}{3}$ D) $\frac{4R}{3}$

86) A tennis ball bounces down a flight of stairs striking each step in turn and rebounding to the half-height of the step. The coefficient of restitution is

A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{\sqrt{2}}$ D) 1

87) A boat of mass 80 kg is floating on still water. A dog of mass 20 kg on the boat is at a distance of 10m from the shore. The dog moves on the boat by a distance of 2m towards the shore. The distance of the dog from the shore is

A) 11.6 m B) 8.4 m C) 9.6 m D) 10.4 m

88) A suitcase is gengtly dropped on a conveyor belt moving at 3 m/s. If the coefficient of friction between the belt and the suitcase is 0.5. Find the displacement of suitcase relative to conveyor belt before the slipping between the two is stopped $(g = 10m/s^2)$

A) 2.7 m B) 1.8 m C) -0.9 m D) 1.2 m

89) The string of a pendulum, having bob of mass m is displaced through 90^o from the vertical and then released. What is the tension in the string when the bob is passing through the mean position?

A) mg B) 3mg C) 5mg D) 6mg

90) A particle is executing uniform circular motion with angular momentum L. If its frequency of rotation is halved and KE is doubled its angular momentum becomes

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

91) A satellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius 1.01 R. The period of the second satellite is longer than that of the first by approximately.

A) 0.5% B) 1.0% C) 1.5% D) 3.0%

92) A simple pendulum has time period T^1. The point of suppension is now moved upwards according to the relation $y = kt^2$, $(k = 1m/sec^2)$ where y is the vertical displacement. The time period now becomes 'T^2' then find the ratio of $\frac{T_1^2}{T_2^2}(g = 10m/sec^2)$

A) $\frac{5}{6}$ B) $\frac{6}{5}$ C) 1 D) $\frac{4}{5}$

93) A metal rope of density $6000kgm^{-3}$ has a breaking stress $9.8 \times 10^8 \mathrm{Nm}^{-2}$ .This rope is used to measure the depth of the sea. Then the depth of the sea that can be measured without breaking is

A) $10 \times 10^3 m$ B) $20 \times 10^3 m$ C) $30 \times 10^3 m$ D) $40 \times 10^3 m$

94) If W is the amount of work done in blowing a bubble of volume V, what will be the amount of work done to blow a bubble of volume 8 V?

A) $2\mathrm{W}$ B) $4\mathrm{W}$ C) $8\mathrm{W}$ D) $16\mathrm{W}$

95) Two raindrops reach the earth with different terminal velocities having a ratio of 16:9. The ratio of their volumes is

A) $4:3$ B) $64:27$ C) $16:9$ D) $3:4$

96) During an experiment, an ideal gas is found to obey an additional law $VP^2 = constant$. The gas is initially at a temperature T and volume V. When it expands to 2V, the temperature becomes

A) $2T$ B) $\sqrt{2}T$ C) $\frac{T}{2}$

D) $\frac{T}{\sqrt{2}}$

97) An isolated tube traveling at a speed 'V' contains 'm' grams of gas of molecular weight 'M'. If the tube is suddenly stopped, the rise in temperature of a gas is

A) $\frac{MV^2(\gamma-1)}{2R}$ B) $\frac{m}{M}\frac{V^2(\gamma-1)}{2R}$ C) $\frac{mV^2\gamma}{2R}$ D) $\frac{MV^2\gamma}{2R}$

98) A Carnot engine whose sink is at 300K has an efficiency of 40.By how much should the temperature of source be increased so as to increase its efficiency by 50 of original efficiency.

A) $280K$ B) $275K$ C) $325K$ D) $250K$

99) A body cools from 60^oC to 40^oC in 7 minutes. What can be its temperature after the next 7 minutes? The temperature of surroundings is 10^oC

A) 20^0C B) 38^0C C) 32^0C D) 28^0C

100) A wire whose linear density is $5\times10^{-3}kg/m$ is strentched between two points with a tension 450 N.The wire resonates at a frequency of 420 Hz. The next heighest frequency at which the same wire resonates is 490 Hz. What is the length of the wire ?

A) 1.2 m B) 1.8 m C) 2.1 m D) 8.1 m

101) Two men stand a certain distance apart beside a long metal fence on a still day; one man places his ear against the fence while the other gives the fence a sharp knock with a hammer. Two sounds separated by a time interval of 0.5 second are heard by the first man. If the velocity of sound in air is $330\mathrm{ms}^{-1}$ and in the metal is $5280\mathrm{ms}^{-1}$, how far apart are the men ?

A) $352m$ B) $330m$ C) $165m$ D) $176m$

102) In a compound microscope, the object is 1 cm from the objective lens. The lenses are 30 cm apart and the intermediate image is 5 cm from the eyepiece. What magnification is produced?

A) 25 B) 50 C) 100 D) 125

103) If a prism of refracting angle 60^0 and refractive index 2 is immersed in a liquid of refractive index $\sqrt{2}$ then the angle of minimum deviation would be

A) $\frac{\pi}{2}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{6}$

104) In an ideal double slit experiment, when a glass plate (refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass plate is :

A) 2λ B) $\frac{2\lambda}{3}$ C) $\frac{\lambda}{3}$ D) λ

105) A uniform electric field pointing in the positive x–direction exists in a region. Let A be the origin, B be the point on the x–axis at $x = +1cm$ and C be the point on the y–axis at $y = +1cm$. Then the potentials at A,B and C satisfy

A) $V_A < V_B$ B) $V_A > V_B$ C) $V_A < V_C$ D) $V_A > V_C$

106) P and Q are two points on the axial line and equatorial line of a short bar magnet at the same distance from its centre. If $\vec{B}_P$ and $\vec{B}_Q$ are the magnetic inductions at P and Q, then (magnetism and matter)

A) $\vec{B}_P = 2\vec{B}_Q$ B) $\vec{B}_P = -2\vec{B}_Q$ C) $\vec{B}_Q = 2\vec{B}_P$ D) $\vec{B}_Q = -2\vec{B}_P$

107) A short magnet is arranged parallel to the meridian with its north pole pointing geographic south then neutral point is formed at a distance 'd'. The magnet is rotated by 90^0 in clockwise direction then the net induction at the same distance on its east side is .....(magnetism and matter)

A) 0 B) $\sqrt{2}B_H$ C) $2B_H$ D) $\sqrt{5}B_H$

108) Three identical condensers are connected in different combinations using all three each time. Arrange the following cases in the decreasing order of effective capacity

a) all in series b) all in parallel

c) two in series and one parallel d) two in parallel and one in series

A) a,d,c,b B) a,b,c,d C) d,c,b,a D) b,c,d,a

109) An electric cable of copper has just one wire of a radius of 9mm. Its resistance is 10Ω.This single copper cable is to be replaced by another cable containing 10 well insulating copper wires each of radius 3mm the resistance of the new cable is

A) 7.5Ω B) 9Ω C) 9.5Ω D) 10Ω

110) You are given 48 cells each of emf 2 V and internal resistance 1Ω . How will you connect them so that the current through an external resistance of 3Ω is the maximum

A) 8 cells in series, 6 such groups in parallel B) 2 cells in series, 4 such group in parallel

C) 16 cells in series, 3 such groups in parallel D) 24 cells in series, 2 such groups in parallel

111) The thermo e.m.f produced in a thermo couple is $3\ \mu V$ per degree. If the temperature of the cold junction is 20^0C and the thermo e.m.f is 0.3 mV, the temperature of the hot junction is

A) 80^0C B) 100^0C C) 120^0C D) 140^0C

112) An electron is accelerated to a high speed along the axis of a cathode ray tube by the application of a potential difference of V volts between the cathode and the anode. The particle then passes through a uniform transverse magnetic field in which it experience a force F. If the potential difference between the anode and the cathode is increased to 2V, the electron will now experience a force

A) $F/\sqrt{2}$ B) $\frac{F}{2}$ C) $\sqrt{2}F$ D) $2F$

113) A metallic square loop ABCD is moving in its own plane with velocity v in a uniform magnetic field perpendicular to its plane as shown in fig. An electric field is induced (EMI)

A) in AD, but not in BC B) in BC, but not in AD C) neither in AD nor in BC

D) in both AD and BC

114) An electron with speed v and a photon with speed c have the same de Broglie wavelength. If the kinetic energy and momentum of electrons is E_e and P_e and that of photon is E_{ph} and P_{ph} respectively, then the correct option is= (DUAL NATURE OF MATTER)

A) $\frac{E_e}{E_{ph}} = \frac{2c}{\vartheta}$ B) $\frac{E_e}{E_{ph}} = \frac{\vartheta}{2c}$ C) $\frac{P_e}{P_{ph}} = \frac{2c}{\vartheta}$ D) $\frac{P_e}{P_{ph}} = \frac{\vartheta}{2c}$

115) A nucleus at rest splits into two nuclear parts having radii in the ratio 1 : 2. Their velocities are in the ratio

A) $8:1$ B) $6:1$ C) $4:1$ D) $2:1$

116) An optical fiber can offer a transmission bandwidth in excess of

A) 100 GHz B) 100 MHz C) 100 Hz D) 100 KHz

117) A heating coil is labeled 100 W, 220 V. The coil is cut in two equal halves and the two pieces are joined in parallel to the same source. The energy now liberated per sec is

A) 200 J B) 400 J C) 25 J D) 50 J

118) A Parallel plate condenser of capacity 100 pF is connected to 230 V of AC supply of 300rad / sec frequency. The rms value of displacement current

A) $6.9\,\mu\,A$ B) $2.3\,\mu\,A$ C) $9.2\,\mu\,A$ D) $4.6\,\mu\,A$

119) A parallel plate capacitor of plate separation 2 mm is connected in an electric circuit having source voltage 400V. If the plate area is $60\,cm^2$, then the value of displacement current for 10^{-6} sec. will be

A) 1.062 amp B) $1.062\times10^{-2}\,amp$ C) $1.062\times10^{-3}\,amp$ D) $1.062\times10^{-4}\,amp$

120) A condenser has two conducting plates of radius 10cm seperated by a distance of 5mm. It is charged with a constant current of 0.15 A. The magnetic field at a point 2cm from the axis in the gap is

A) $6\times10^{-8}\,T$ B) $3\times10^{-8}\,T$ C) $6\times10^{-6}\,T$ D) $3\times10^{-6}\,T$

121) EAN of M in $\left[M(CO)_x\right]$ is 36, the value of x is _____ atomic number of M is 26.

A) 4 B) 6 C) 5 D) 3

122) The ionization potential of X^- ion is equal in magnitude to

A) Electron affinity of X^+ B) Ionisation potential of X C) Ionisation potenital of X^+

D) Electron affinity of X

123) Fractional bond order is in

A) O_2 B) O_2^+ C) O_2^{2-} D) N_2

124) In O_3 molecule, the formal charge of terminal oxygen and central oxygen are

A) -1,1 B) -1,0 C) 1,1 D) 1,0

125) $CaCO_3 \xrightarrow{\triangle} X + CO_2, X + 3C \rightarrow Y + CO, Y + 2H_2O \rightarrow Z + Ca(OH)_2$

Incorrect statement about Z is

A) It contains two acidic hydrogens B) with S_2Cl_2 it forms mustard gas

C) it is used in Hawker's lamp

D) it has garlic smell due to the presence of impurities hydrogen sulphide and phosphine

126) In the following sequence of reactions the product (D) is

$CH \equiv CH \xrightarrow{HBr} A \xrightarrow{HBr} B \xrightarrow{alcKOH} C \xrightarrow{NaNH_2} D.\ D\ is$

A) Ethanol B) Ethyne C) Ethanal D) Ethene

127) The single bond between sulphur atoms is present in

A) $H_2S_2O_3$ B) $H_2S_2O_7$ C) $H_2S_2O_2$ D) $H_2S_2O_6$

128) The expression for $'P_c'$ of gas can be

A) $\frac{PV}{RT}$ B) $3b$ C) $\frac{a}{27\,b^2}$ D) $\frac{8a}{27\,Rb}$

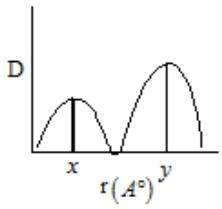
129) Which of the following is an aromatic compound

A) Phenol B) Naphthalene C) Pyridine D) All

130) A hydrogen molecule and helium atom are moving with the same velocity. Then the ratio of their de-Brogile wave length is

A) 1:1 B) 4:1 C) 1:4 D) 2:1

131) The distance between x and y in the radial distribution curve drawn for 2s orbital is



A) $1.1\ A^0$ B) $2.6\ A^0$ C) $0.53\ A^0$ D) $2.07\ A^0$

132) Which of the reaction take place during isolation of inert gases from air by Fischer - Ringes method

a) $CaC_2 + N_2 \xrightarrow{1073K} CaCN_2 + C$

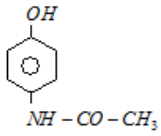
b) $CuO + CO \rightarrow Cu + CO_2$

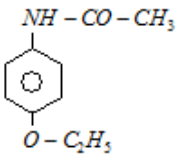
$c)\ CO_2 + 2KOH \rightarrow K_2CO_3 + H_2O$

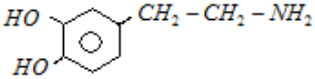
d) $N_2 + 3Mg \rightarrow Mg_3N_2$

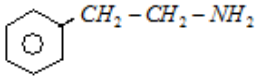
A) all the above B) only d C) only a D) a,b,c only

133) The structure of phenacetin is

A) 

B) 

C) 

D) 

134) Gutta percha is

A) Cis - 1,4 - Poly isoprene B) Trans - 1,2 - poly isoprene C) Cis - 1,2 - poly isoprene

D) Trans - 1,4 - poly isoprene

135) A vessel contains a mixture of equal weights of CH_4, O_2 and SO_2 at a pressure of 600mm of Hg. The partial pressure of CH_4 in mm is

A) 34.28 B) 342.8 C) 171.4 D) 85.7

136) Regarding V_A group hydrides, incorrect one is

A) Ease of formation : $NH_3 > PH_3 > AsH_3$

B) Stability order : $BiH_3 > SbH_3$

C) Boiling point order : $PH_3 < AsH_3 < NH_3 < SbH_3$

$> SbH_3 > BiH_3$ $> AsH_3 > PH_3 > NH_3$

D) Diphosphine is the impurity present in trace amounts in phosphine

137) If $\triangle H^0$ and $\triangle S^0$ of a reaction are –180 kJ/mole and $-60Jk^{-1}\,mole^{-1}$.The reaction becomes spontaneous

A) at 3000 K B) below 3000 K C) above 3000 K D) spontaneous at all temperature

138) For the reaction $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ the degree of dissociation (α) of HI(g) is related to the equilibrium constant K_p , by expression.

A) $\frac{1+2\sqrt{K_p}}{2\sqrt{K_p}}$ B) $\sqrt{\frac{1+2K_p}{2}}$ C) $\sqrt{\frac{2K_p}{1+2K_p}}$ D) $\frac{2\sqrt{K_p}}{1+2\sqrt{K_p}}$

139) E^0 of Fe^{+2}/Fe is –0.44V and E^0 of Cu^{+2}/Cu is +0.34V. Then in the cell

A) Cu oxidises Fe^{+2} ion B) Cu^{+2} oxidises iron C) Cu reduces Fe^{+2} ion

D) Cu^{+2} ion reduces Fe

140) Zn is used to protect corrosion of iron because

A) E^o_{ox} of Zn < E^o_{ox} of Fe B) E^o_{red} of Zn <E^o_{red} of Fe C) Zn is cheaper than Fe

D) Zn is abundantly available

141) Incorrect statement among the following is

A) Lyophilic sols are stable B) Low molecular weight inorganic sols are lyophobic

C) Starch solution is lyophilic sol D) Cloud is lyophilic sol

142) In the equilibrium, $NH_4HS_{(S)} \rightleftharpoons NH_{3(g)} + H_2S(g)$.. The forward reaction can be favoured by

A) Adding some more NH_4HS B) Adding some more H_2S C) Adding some more NH_3

D) Removing some ammonia from the reaction mixture

143) A solid has a structure in which 'W' atoms are located at the corners of a cubic lattice, 'O' atoms at the centre of edges and 'Na' atoms at the centre of the cube. The formula for the compound is

A) $NaWO_2$ B) $NaWO_3$ C) Na_2WO_3 D) $NaWO_4$

144) Silicon tetrafluoride on hydrolysis gives

A) Ortho silicic acid and meta silicic acid B) Meta silicic acid and silica

C) Meta silicic acid and hydro hexafluorosilicate D) Ortho silicic acid and hydro fluoro silicic acid

145) According to octet rule SO_3 contains -----number of dative bonds

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

146) $[Co(tn)_2Cl_2]Cl$ and $[Co(pn)_2Cl_2]Cl$ are

A) Hydrate isomers B) Ligand isomers C) Ionisation isomers D) Geometrical isomers

147) The solution containing 6.8 grams of non-ionic solute in 100 grams of water was found to freeze at $-0.93^\circ C$.. If K_f for water is 1.86, the molar mass of solute is

A) 13.6 B) 68 C) 34 D) 136

148) The rate constant, Activation energy and the Arrhenius parameter of a chemical reaction at $25^\circ C$ are $3 \times 10^{-4} s^{-1}$, 104.4 kj/mole and $6 \times 10^{14} s^{-1}$ respectively.The value of the rate constant as $T \to \infty$ is

A) $2 \times 10^{18} s^{-1}$ B) $6 \times 10^{14} s^{-1}$ C) Infinity D) $3.6 \times 10^{30} s^{-1}$

149) The weight of $NaOH$ needed to prepare 500ml. solution of $p^H = 12$ is

A) 0.4 g B) 0.2 g C) 12 g D) 6 g

150) The K_a value of a week acid is 10^{-6}. The p^H of the buffer solution obtained by adding 0.2 moles of its salt with a strong base to one - litre of 0.1M solution of the acid is

A) 6.3 B) 7.7 C) 7 D) 4.5

151) $8Al + 30HNO_3 \rightarrow 8Al(NO_3)_3 + 3NH_4NO_3 + 9H_2O$ As per the above balanced

equation the number of moles of Al that can reduce 1 mole HNO_3 is

A) $\frac{3}{8}$ B) $\frac{16}{3}$ C) $\frac{9}{8}$ D) $\frac{8}{3}$

152) $C_6H_5OH + NH_3 \overset{Y/300^\circ C}{\longrightarrow} C_6H_5NH_2 \overset{X/200^\circ C}{\longrightarrow} C_6H_5Cl + 2NH_3$ X and Y are

A) $ZnCl_2, Cu_2O$ B) $Cu_2O, ZnCl_2$ C) $CuCl_2, ZnO$ D) $Cu_2Cl_2, ZnCl_2$

153) 2 – Butanol can be obtained by the hydrolysis of the addition product formed between

A) $HCHO, C_3H_7MgBr$ B) CH_3COH_3, C_2H_5MgI C) CH_3CHO, C_2H_5MgBr

D) CH_3CHO, CH_3MgCl

154) If $CH_3COOH + NH_3 \longrightarrow X \underset{\Delta}{\longrightarrow} Y + H_2O$ then X and Y are respectively

A) $CH_3CONH_2; CH_4$ B) $CH_3COONH_4; CH_3CONH_2$

C) $CH_3CONH_2; CH_3COOH$ D) $CH_3NH_2; CH_3CONH_2$

155) P^H value for a neutral amino acid (x) at an isoelectric point is 5.8. Now its solubility at this point in water is

A) Maximum B) Minimum C) Zero D) Unpredictable

156) In the Hydrogen atom as ‘n’ value increases the distance and energy difference between adjacent orbits respectively

A) Decreases, Decreases B) Increases, Decreases C) Increases, Increases

D) Decreases, Increases

157) In the Fischer’s esterification process, the cleavage of bonds

A) $O - H of\, C_2H_5OH and C - O\, of\, CH_3COOH$

B) $C - O\ of\, C_2H_5OH\ and\, O - H\, of\, CH_3COOH$

C) $O-H\ of\ C_2H_5OH\ and\ C-C\ of\ CH_3COOH$

D) $C-C\ of\ C_2H_5OH\ and\ O-C\ of\ CH_3COOH$

158) The iron obtained from blast furnace is

A) Pig iron B) Soft iron C) Steel D) Wrought iron

159) The number of ATP molecules produced per 1 molecule of glucose in the biochemical reaction is

A) 18 B) 36 C) 54 D) 9

160) The compound that denotates on rubbing is

A) P_4O_{10} B) NO_2 C) XeO_3 D) XeF_4