KCET MODEL PAPER-1

REVAMP24

Duration : 3 Hourse | Max Marks : 180

MATHEMATICS

1. Area enclosed in the curves $y^2 = 4x$ and the line $x = 2y$ is

(a) 64 sq. units (b) 64/3 sq. units
(c) 8 sq. units (d) 0.

2. The angle between the curves $y^2 = 16x$ and $2x^2 + y^2 = 18$ at their point of intersection is

(a) 0 (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$.

3. The subtangent to the curve $y^2 = \frac{x^3}{2a-x}$ at (a,a) is

(a) $\frac{a}{2}$ (b) a (c) $2a$ (d) $3a$.

4. The subnormal at any pointion the curve $y^n = ax$ is a constant. Then the value of x is

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

5. The area A of an equilateral triangle is increasing at the rate of 4 sq. cm. per second. The rate at which the sides increasing when the area is $4\sqrt{3}$ sq. cms. is

(a) $8\sqrt{3}$ cm/sec (b) $2\sqrt{3}$ cm/sec
(c) $\frac{1}{\sqrt{3}}$ cm/sec (d) $\frac{2}{\sqrt{3}}$ cm/sec.

6. If $f(x) = \frac{1}{1-x}(x \neq 1), f\{f[f(x)]\}$ is

(a) $\frac{1}{(1-x)^3}$ (b) 1 (c) x (d) $\frac{1}{1-x}$.

7. $f(x) = \frac{1}{1-x^2}$ and $g(x) = x$, then $fog(x)$ is

(a) $\cos^2\theta$ (b) $\sin^2\theta$
(c) $\tan\left(\frac{1}{1+x^2}\right)$ (d) $\tan^2\theta$.

8. If $f: A \to R$ is a real valued function the domain of the function $f(x) = \sqrt{x-3} + \sqrt{2-x}$

(a) $2 \le x \le 2$ (b) $x \ge 3$ (c) $x \le 2$ (d) Φ.

9. If $f: R \to R$ defined by $f(x) = x^5 + 1$ and if $fog(x) = x$ then $g(x)$ is given by

(a) $x^5 - 1$ (b) $(x-1)^{1/5}$ (c) $(x^5-1)^{1/5}$ (d) $\frac{1}{x^5+1}$

10. The implication $p \to q$ is false only when

(a) p is true and q is false (b) p is ture and q is true
(c) p is false and q is true (d) p is false and q is false.

11. If $\begin{bmatrix} 3 & 4 \\ -2 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 11 \\ 4 \end{bmatrix}$, then the values of x, y are given respectively by

(a) $x = 4, y = 11$ (b) $x = 6, y = 3$
(c) $x = 4, y = -11$ (d) $x = 1, y = 2$.

12. The value of the determinant $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is

(a) $(a + b + c)_3$ (b) 0
(c) $(1 - a)(1 - b)(1 - c)$ (d) $a^3 + b^3 + c^3$.

13. If ω is the cube root of unity then $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix} =$

(a) 3 (b) ω^2 (c) $1 - \omega$ (d) 0.

14. The inverse of the matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is

(a) $\frac{1}{(ad-bc)}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ (b) $\begin{bmatrix} d & b \\ c & a \end{bmatrix}$

(c) $\frac{1}{(ad-bc)}\begin{bmatrix} d & b \\ c & a \end{bmatrix}$ (d) $\begin{bmatrix} a & d \\ b & c \end{bmatrix}$.

15. Eigen values of the matrix $A = \begin{bmatrix} 3 & +2 \\ 1 & 2 \end{bmatrix}$ are

(a) (3, 2) (b) (–1,–4) (c) (1, 4) (d) (4, –1).

16. In four numbers given the first three numbers are in G. P. and the last three numbers are in A. P. with common difference 6. If the first and last numbers are equal then the are

(a) 8, –4, 2, 8 (b) 9, –3, 1, 9
(c) 7, –2, 3, 7 (d) none of these.

17. One of the following is perpendicular to $2\hat{i}+2\hat{j}-\hat{k}$

(a) $-2\hat{i}-2\hat{j}+\hat{k}$ (b) $\hat{i}+\hat{j}-\frac{1}{2}\hat{k}$

(c) $2(\hat{i}+\hat{j})+8\hat{k}$ (d) $\hat{i}+\hat{j}+\hat{k}$.

18. If $\hat{l}$ and $\hat{m}$ are unit vectors and θ is the angle between, then θ is given by

(a) $\cos\theta=|\hat{l}-\hat{m}|$ (b) $\sin\frac{\theta}{2}=\frac{1}{2}|\hat{l}-\hat{m}|$

(c) $\cos\frac{\theta}{2}=\frac{1}{2}|\hat{l}-\hat{m}|$ (d) $\tan\frac{\theta}{2}=\frac{1}{2}|\hat{l}-\hat{m}|/|\hat{l}-\hat{m}|$

19. A particle is displaced from the point whose position vector is $5\hat{i}+\hat{j}+\hat{k}$ to the point $9\hat{i}+3\hat{j}+8\hat{k}$ under the action of constant forces defined by $9\hat{i}+5\hat{j}-\hat{k}$, $6\hat{i}-3\hat{j}-2\hat{k}$ and $7\hat{i}-8\hat{j}+3\hat{k}$. The work done by these forces is

(a) 0 (b) 24 (c) 32 (d) 92.

20. The magnitude of the torque about the point $3\hat{i}+2\hat{j}-2\hat{k}$ of force $\vec{F}=4\hat{j}+\hat{k}$ acting through the point $\hat{i}+\hat{j}+\hat{k}$ is

(a) 23 (b) $\sqrt{237}$ (c) 37 (d) $\sqrt{137}$.

21. The set $z = \{1, 2, 3, 4\}$ is an abelian group under

(a) addition modulo 4 (b) addition modulo 5
(c) multiblication modulo 5
(d) multiplication modulo 4.

22. If in the standard form of the cubic $x^3+3Hx+G = 0$ where H and G are real we have $G^2 + 4H^3 = 0$, then

(a) the equation has a pair of complex roots
(b) the equation has two equal roots
(c) Cardon's method fails to give the solution
(d) none of the above holds

23. The number of permutations of n different things not more than r and not less than or equal to S $(s < r)$ at a time when each thing may be repeated any number of times is

(a) $\frac{n}{n-1}(n^r-n^s)$ (b) $\frac{n}{n-1}(n^s-n^r)$

(c) ${}^rC_s$ (d) none of these.

24. If the binary operation is defined by $a*b = a+b-5$ over Z, the identity element is

(a) 0 (b) 1 (c) 4 (d) 5.

25. The equation of the circle the two ends of its diameter are $(a, 2a)$ and $(2a, a)$ is

(a) $x^2 + y^2 - 3ax - 3ay + 4a^2 = 0$
(b) $x^2 + y^2 - 12ax - 12ay + 114a^2 = 0$
(c) $x^2 + y^2 + 3ax + 3ay - 4a^2 = 0$
(d) $x^2 + y^2 - 3ax + 3ay + 4a^2 = 0$.

26. The equation of the circle passing through the centre of the circle C given by $x^2 + y^2 - 2x - 2y - 23 = 0$ and having its centre at (4, 5) is

(a) $x^2 + y^2 + 8x + 10y - 16 = 0$
(b) $x^2 + y^2 - 8x - 10y + 16 = 0$
(c) $x^2 + y^2 + 8x + 10y + 16 = 0$
(d) $x^2 + y^2 + 4x + 5y + 25 = 0$.

27. The value of k for which the circles $x^2 + y^2 + 3x - 7y + k = 0$ and $x^2 + y^2 - 4x + 2y - 14 = 0$ would intersect orthogonally

(a) $k = -2$ (b) $k = -1$ (c) $k = 0$ (d) $k = 1$.

28. The radical axis of the circles $C_1 = x^2 + y^2 + 4x + 8y + 6 = 0$ and $C_2 = 2x^2 + 2y^2 + 6x + 6y - 3 = 0$ is

(a) $2x - 10y + 15 = 0$ (b) $2x + 10y - 15 = 0$
(c) $2x + 10y + 15 = 0$ (d) $2x - 10y - 15 = 0$.

29. The limiting points of the co-axial system determined the circles $x^2 + y^2 + 6x - 8y - 5 = 0$ and $x^2 + y^2 + 10x - 10y - 10 = 0$ is

(a) (1, 2) and (3, 1) (b) (– 1, 2) and (–3, –1)
(c) (1 – 1, 2) and (– 3, 1) (d) (1, –2) and (1, –3)

30. The equation of the parabola with its axis parallel to x-axis and passing through (4, –6), (7, 6) and (3, –2) is

(a) $y^2 + 16x - 4y - 52 = 0$ (b) $y^2 + 4y - 16x + 52 = 0$
(c) $y^2 + 4y + 16x - 52 = 0$ (d) $y^2 - 4y - 16x - 52 = 0$

31. The co-efficients of x^2 and x^3 in the expansion of $(3 + kx)^9$ are equal. Then the value of k is

(a) 1 (b) 9/2 (c) 9/7 (d) 5/7.

32. The distance between the directrices of an ellipse is four times the distance between their foci. Then the eccentricity of the ellipse is

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) 1 (d) $\frac{1}{2}$.

33. If $x + 3y + k = 0$ touches the ellipse $\frac{x^2}{64}+\frac{y^2}{4}=1$ then the value of k is

(a) ±4 (b) ±10 (c) ±8 (d) ±6.

34. The product of the perpendicular from any point $P(x, y)$ on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ to its asymptotes is

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

(c) $\frac{zy}{\sqrt{x^2+y^2}}$ (d) $\frac{ab}{a+b}$.

35. The partial fractions of $\frac{x^3-5}{(x-1)^3(x+2)}$ are of the form

(a) $\frac{A}{(x-1)^3}\frac{B}{x+2}$

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

(c) $\frac{Ax^2+Bx+C}{(x-1)^3}+\frac{C}{x+2}$ (d) none of these.

36. Which of the following in not true if $a \equiv bx \pmod m$ and $x \in Z$?

(a) $a + x \equiv b + x \pmod m$

(b) $ax \equiv bx \pmod m$ (c) $a - x \equiv b - x \pmod m$

(d) $a \div x \equiv b \div x \pmod m$.

37. $2\tan^{-}\frac{1}{3}+\tan^{-}\frac{1}{7}$ is equal to

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$.

38. The equation $ax^2+2\sqrt{ab}\,xy+by^2=0$ represents

(a) pair of perpendicular lines

(b) a pair of lines passing through origin

(c) a pair of coincident lines

(d) none of these.

39. $\underset{n\to\infty}{Lt}\frac{\left(1^2+2^2+3^3+.....+n^2\right)}{\left(1^3+2^3+3^3+.....+n^3\right)}=$

(a) 0 (b) 1

(c) −1 (d) none of these.

40. The general solution of $\sin x + \sin 2x + \sin 3x = 0$ is

(a) $x=(2n+1)\pi\pm\frac{\pi}{3}$ (b) $x=2m\pi\pm\frac{2\pi}{3}, x=\frac{m\pi}{2}$

(c) $x=2m\pi\pm\frac{\pi}{3}$

(d) $x=(2n+1)\pm\frac{\pi}{6}, x=(2n+1)\frac{\pi}{2}$.

41. If the bisector of the angle A of ΔABC makes an angle θ with BC, then $\sin\theta$ equals

(a) $\cos\frac{B-C}{2}$ (b) $\sin\frac{B-C}{2}$

(c) $\sin\left(B-\frac{A}{2}\right)$ (d) $\sin\left(C-\frac{A}{2}\right)$.

42. $(1 - i)^9$ is equal to

(a) (1 − i) (b) 16 − 16i

(c) (1 + i) (d) 16 + 16i.

43. $\left|\frac{1}{(3+i)^2}-\frac{1}{(3-i)^2}\right|=$

(a) $\frac{1}{18}$ (b) 0 (c) $\frac{3}{25}$ (d) $\frac{9}{625}$.

44. If 1, ω, ω^2 are the cube roots of unity the value of $(1-\omega+\omega^2)^5+(1+\omega-\omega^2)^5$ is equal to

(a) 32 (b) 16 (c) 64 (d) 4.

45. Let $f(x)=\begin{cases}\frac{x^2-16}{x-4} & \text{if } x\neq 4\\ k & \text{if } x=4\end{cases}$

The the value of k which will make $f(x)$ continuous at $x = 4$ is

(a) 4 (b) 6 (c) 8 (d) 12.

46. On differentiating $y=\frac{xe^x}{1+x^2}$ with respect to x we get

(a) $(x^3-x^2+x+1)\frac{e^x}{(1+x^2)^2}$

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

(c) $\frac{(x^3+x^2-x-1)e^x}{(1+x^2)^2}$ (d) $\frac{(x^3+2x^2-3x+1)e^x}{(1+x^2)^2}$.

47. If $y\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}$ then $\frac{dy}{dx}=0$

(a) $\frac{1}{2}\left(\frac{1-\cos 2x}{1+\cos 2x}\right)^{-1/2}$ (b) $\cot^2 x$

(c) $\sec^2 x$ (d) $\left(\frac{1+\cos 2x}{1-\cos 2x}\right)^{3/2}$.

48. If $p_1 p_2, p_3$ are the lengths of altitudes of a triangle from the vertices A, B, C and Δ the area of the triangle then $\frac{1}{p_1}+\frac{1}{p_2}+\frac{1}{p_3}=$

(a) $\frac{2ab}{(a+b+c)\Delta}\cos^2\frac{A}{2}$ (b) $\frac{2ab\cos^2 C/2}{(a+b+c)\Delta}$

(c) $\frac{2ab\cos^2 B/2}{(a+b+c)\Delta}$ (c) none of these.

49. Let $y = a\cos(\log x) + b\sin(\log x)$, then

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

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

50. The equation of the tangent to the curve $y^2 = 10 - 5x$ parallel to the line $10x + 8y + 221 = 0$ is

(a) $5x - 4y - 14 = 0$ (b) $5x + 4y + 14 = 0$

(c) $x - y + 2 = 0$ (d) $4x - 5y + 14 = 0$.

51. The value of the integrat $\int\sqrt{\frac{1-x}{1+x}}dx$ is

(a) $\sin^{-1}x+\sqrt{1-x^2}+C$ (b) $\cos^{-1}x+\sqrt{1-x^2}+C$

(c) $\sin^{-1}x+\log\sqrt{1-x^2}+C$

(d) $(\sin^{-1}x)^2 + C$.

52. $\int\sin^4 x\,dx =$

(a) $\frac{1}{8}\left[x-\sin 2x+\frac{\sin 4x}{4}\right]+C$

(b) $\frac{1}{8}\left[3x-3\sin 2x+\frac{\sin 4x}{4}\right]+C$

(c) $(\sin x - \sin 3x + \sin 4x) + C$

(d) $\left[3x-2\sin 2x+\frac{\sin 4x}{4}\right]+C$.

53. $\int x\log x\,dx =$

(a) $\left(x\log x+\frac{1}{x}\right)+C$ (b) $\frac{x^2}{2}\log x+\log x+C$

(c) $\frac{x^2}{2}\left(\log x-\frac{1}{2}\right)+C$ (d) $\frac{x^2}{2}(\log x+1)+C$.

54. $\int_0^{\pi/2} x\sin^2 x\,dx =$

(a) $\frac{\pi^2}{4}+\frac{1}{16}$ (b) $\frac{\pi^2}{16}+\frac{1}{4}$

(c) π^2 (d) 0.

55. $\int_0^{\pi/2}\frac{\sin^{7/2}x}{\left(\sin^{7/2}x+\cos^{7/2}x\right)}dx =$

(a) 0 (b) $\pi/4$ (c) $3\pi/2$ (d) 0.

56. If a compound proposition obtained by combining two propositions p and q is false only when both p and q are false and true in all the other cases, then the compound proposition is

(a) conjuction (b) disjunction

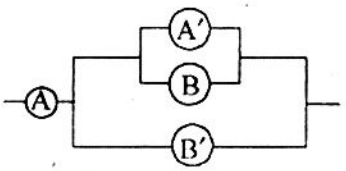
(c) implication (d) equivalence.

57. Pick out the compound proposition which is a taugology.

(a) $(p \wedge q) \to p$ (b) $p \to q$

(c) $p \to q$ (d) $p \wedge q \to \sim p$.

58. Write down the Boolean polynomial for the circuit



(a) $A \vee\{(A' B) \wedge B\}$ (b) $A \wedge \{(A' B) \vee B'\}$

(c) $(A \vee B')\{\vee (A \wedge B')\}$ (d) $(A \wedge A')(B \wedge B')$

59. If $f(x) = ln\,(x)$, $g(x) = x^3$ then $f(g(ab)) =$ .....

(a) $f(g(a) + g\,b))$ (b) $f(g(ab))$

(c) $g(f(ab))$ (d) $g(f(a) + f(b))$

60. If $A=\begin{bmatrix}\cos^3\theta & \sin\theta\\ -\sin^3\theta & \cos^3\theta\end{bmatrix}$ than $A^3 =$

(a) $\begin{bmatrix}\cos^3\theta & \sin^3\theta\\ -\sin^3\theta & \cos^3\theta\end{bmatrix}$

(b) $\begin{bmatrix}\cos^2\theta\sin\theta & \sin^2\theta\cos\theta\\ -\sin^2\theta\cos\theta & \cos^2\theta\sin\theta\end{bmatrix}$

(c) $\begin{bmatrix}\cos 3\theta & \sin 3\theta\\ -\sin 3\theta & \cos 3\theta\end{bmatrix}$ (d) $\begin{bmatrix}\sin 3\theta & \cos 3\theta\\ -\cos 3\theta & \sin 3\theta\end{bmatrix}$

PHYSICS

61. A photon will have greater energy if it has greater

(a) Wavelength (b) Amplitude

(c) Frequency (d) Velocity

62. The phenomenon of radioactivity is associated with

(a) Decay of the nucleus

(b) Nuclear reaction caused by cosmic rays

(c) Decay of the atom (d) Fusion of the nucleus

63. During total solar eclipse, the spectrum of the sunlight observed is

(a) Line emission spectrum

(b) Continuous spectrum

(c) Line absorption spectrum

(d) Band spectrum

64. Telescopes with large aperture objectives are chosen because they

(a) Have less aberrations

(b) Have better dispersion
(c) Have better resolution
(d) Can see larger objects

65. An electron of mass m and charge e is moving from rest through a potenial difference V in vacuum. Its final speed is

(a) $\frac{\sqrt{2eV}}{m}$ (b) $\frac{eV}{2m}$
(c) $\frac{\sqrt{eV}}{m}$ (d) $\frac{eV}{m}$

66. Neglecting variation of mass with energy, the wavelength associated with an electron having a kinetic energy E is proportional to

(a) $\sqrt{E}$ (b) $1/\sqrt{E}$
(c) E (d) E^{-2}

67. When a microgram of matter is converted into energy, the amount of energy released will be
(a) 9×10^{14} joule (b) 9×10^{7} joule
(c) 9×10^{10} joule (d) 3×10^{4} joule

68. During a nuclear fusion reaction
(a) A heavy nucleus breaks into two fragments by itself
(b) A heavy nucleus bombarded by thermal neutrons breaks up
(c) A light nucleus bombarded by thermal neutrons breaks up
(d) Two light nuclei combine to give a heavier nucleus and possibly other products

69. The ratio of the radii of the nuclei $^{27}_{12}Al$ and $^{125}_{52}Te$ is
(a) 6 : 10 (b) 40 : 77
(c) 13 : 52 (d) 14 : 73

70. A rider on a horse back falls forward when the horse suddenly stops. This is due to
(a) The inertia of the horse
(b) Large weight of the horse
(c) The inertia of the rider
(d) Loosing the balance

71. Vectors A and B have equal magnitude. In addition, the magnitude of their resultant is also equal to the magnitude of either of them. Then A and B are at an angle of
(a) 30° (b) 90°
(c) 60° (d) 120°

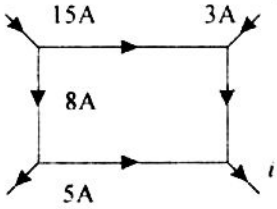
72. Two stones are thrown from the top of a tower- one straight down with an initial speed u and the second straight up with the same speed u. When the two stones hit the ground, they will have speeds in the ratio
(a) 1 : 1 (b) 2 : 1
(c) 1 : 2 (d) 2 : 3

73. At 30 volt D.C. and 90 watt bulbs glows at full power. The value of 'r' be joined in series to work the bulbs on 120 volts D.C. is
(a) 30 Ω (b) 10 Ω
(c) 60 Ω (d) 20 Ω

74. Which dimensions will be the same as that of time?
(a) LC (b) L/R
(c) R/L (d) C/L

75. A uniform wire of 16 Ω resistance is made into the form of a square. Two opposite corners of the square are connected by a wire of resistance 16 Ω. The effective resistance between the other two opposite corners is
(a) 32 Ω (b) 8 Ω
(c) 16 Ω (d) 4 Ω

76. The value of current in the given circuit is



(a) 3 A (b) 23 A
(c) 13 A (d) –3 A

77. A man runs towards a mirror at a rate of 6 m/s. If we assume the mirror to be at rest, his image will have a velocity
(a) +12 m/s (b) –6 m/s
(c) +6 m/s (d) –12 m/s

78. In a reflecting astronomical telescope, if the objective (a spherical mirror) is replaced by a parabolic mirror of the same focal length and aperture, then
(a) The final image will be erect
(b) The telescope will gather more light
(c) The larger image will be obtained
(d) Spherical aberration will be absent

79. The condition for observing Fraunhoffer diffraction from a single slit is that the wave fronts incident on the slit should be
(a) Spherical (b) Planar
(c) Cylindrical (d) Elliptical

80. Which of the following does not support the wave nature of light?
(a) Interference (b) Polarisation
(c) Diffraction (d) Photoelectric effect

81. When a $_6Be^{13}$ atom is bombarded with α-particles, one of the products of nuclear transmutation is $_6C^{12}$. The other is
(a) $_{-1}e^0$ (b) $_1D^2$
(c) $_1H^1$ (d) $_0n^1$

82. What is the mass of one curie of U^{234}?
(a) 3.7×10^{10} g (b) 3.7×10^{-10} g
(c) 2.348×10^{-23} g (d) 1.438×10^{-11} g

83. A radioisotope has a half life of 5 years. The fraction of the atoms of this material that would decay in 15 years will be
(a) 1 (b) 7/8
(c) 2/3 (d) 5/8

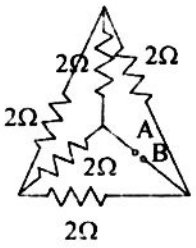
84. X-ray region lies between
(a) Short radio waves and visible region
(b) Gamma rays and ultraviolet region
(c) Visible and ultraviolet region
(d) Short radio waves and long radio waves

85. An electron jumps from the 4th orbit to the 2nd orbit of hydrogen atom. Given the Rydberg's constant $R = 10^5\ cm^{-1}$ the frequency in Hz of the emitted radiation will be
(a) $\frac{3}{10} \times 10^5$ (b) $\frac{9}{15} \times 10^{12}$
(c) $\frac{3}{16} \times 10^{15}$ (d) $\frac{3}{4} \times 10^{16}$

86. In an adiabatic change, the pressure P and temperature T of a monoatomic gas are related by the relation $P \propto T_C$ where C equals
(a) $PV = 8RT$ (b) $PV = RT$
(c) $PV = \frac{RT}{4}$ (d) $PV = \frac{RT}{2}$

87. A satellite in force-free space sweeps stationary interplanetary dust at a rate of $dM/dt = \alpha\upsilon$, where M is the mass and υ the speed of the satellite, and α is a constant. What is the deceleration that satallite experiences?
(a) $-2\alpha\upsilon^2/M$ (b) $-\alpha\upsilon^2/2M$
(c) $-\alpha\upsilon^2/M$ (d) $-\alpha\upsilon^2$

88. In the network shown in the figure, each of the resistance is equal to 2 Ω. The resistance between the points A and B is
(a) 3 Ω
(b) 1 Ω
(c) 2 Ω
(d) 4 Ω



89. If resistance of 100 Ω, and inductance of 0.5 Henry and capacitance of $10 \times 10^{-6}\mu F$ are connected in series through 50 Hertz AC supply then impedence is
(a) 1.876 Ω (b) 187.6 Ω
(c) 18.76 Ω (d) 101.3 Ω

90. An aeroplane in which the distance between the tips of the wings is 50 metres is flying horizontally with a speed of 360 km/hr over a place where the vertical component of the earth's magnetic fields is 2.0×10^{-4} weber/m^2. The potential difference between the tips of the wings would be
(a) 2.1 volt (b) 4.2 volt
(c) 3.0 volt (d) none of these

91. In L.C.R. circuit the capacitance is changed from C to 4C. For the same resonant frequency, the inductance should be changed from, L to
(a) $2L$ (b) $L/4$
(c) $L/2$ (d) $4L$

92. A voltmeter with a resistance of 50×10^3 Ω is used to measure voltage in a circuit. To increase its range to 3 times, the additional resistance to be put in series is
(a) 10^5 Ω (b) 900 K Ω
(c) 150 K Ω (d) 9×10^6 Ω

93. The walls of the halls built for music concerts should
(a) Amplify sound (b) Transmit sound
(c) Reflect sound (d) Absorb sound

94. Ultrasonic sound waves
(a) Can be heard by a normal human ear
(b) Cannot be heard
(c) Can be heard with the help of a normal hearing aid
(d) Can be heard with the help of microphone

95. A hollow metallic tube of length L and closed at one end produces resonance with a tunning fork of frequency n. The entire tube is then heated carefully so that at equilibrium temperature its length changes by l. If the change in velocity V of sound is υ the resonance will now be produced by tuning fork whose frequency is
(a) $\frac{V+\upsilon}{4(L+l)}$ (b) $\frac{V+\upsilon}{4(L-l)}$
(c) $\frac{V-\upsilon}{4(L-l)}$ (d) $\frac{V-\upsilon}{4(L+l)}$

96. A train carriage moves along the x-axis with a uniform acceleration $\vec{a}$. An observer A in the train sets a ball in motion on the frictionless floor of the carriage with a velocity $\vec{u}$ relative to the carriage. The direction of $\vec{u}$ makes an angle θ with the x-axis. Let B be an observer standing on the ground outside the train. The subsequent path of the ball will be
(a) A straight line with respect to observer A
(b) Parabolic with respect to observer A
(c) A straight line with respect to observer B
(d) None of the above

97. For a gas $\gamma = \frac{5}{3}$ 800 cc of this gas is suddenly compressed to 100 cc. If the initial pressure is P, then the final pressure will be

(a) $\frac{P}{32}$ (b) 8 P

(c) $\frac{24}{5}P$ (d) 32 P

98. A man is standing on a weighing machine placed in a lift. When stationary his weight is recorded as 40 kg. If the lift is accelerated upwards with an acceleration of 2 m/s^2, then the weight recorded in the machine will be (g = 10 m/s^2)

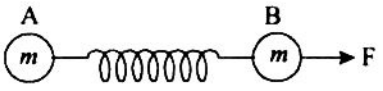
(a) 32 kg (b) 42 kg
(c) 40 kg (d) 48 kg

99. When two bodies collide elastically, then

(a) Kinetic energy of the system alone is conserved
(b) Both energy and momentum are conserved
(c) Only momentum is conserved
(d) Neither energy nor momentum is conserved

100. Two identical bodies A and B of mass m each are connected by a spring. The body B is pulled by applying a constant force F. The body A moves with acceleration 'a'. Therefore acceleration of B is given by

(a) $\frac{F}{m} - a$
(b) a
(c) $-F/m$
(d) F



101. The permittivity of free space $\varepsilon_0 = 8.86 \times 10^{-12}$ coulomb/N-m^2 and the permeability of the free space $\mu_0 = 1.26 \times 10^{-6}$ henry/metre. If c is the velocity of light in vacuum, the correct relation between μ^0, ε_0 and c is

(a) $\mu_0 c^2 = \varepsilon_0$ (b) $\mu_0 \varepsilon_0 = 1/c^2$
(c) $\mu_0 \varepsilon^2 = c^2$ (d) $\mu_0 \varepsilon_0 = 1/c$

102. A charged particle moves with velocity $\vec{v}$ in a uniform magnetic field $\vec{B}$. The magnetic force experienced by the particle is

(a) Always zero
(b) Zero if $\vec{B}$ and $\vec{v}$ are perpendicular
(c) Never zero
(d) Zero if $\vec{B}$ and $\vec{v}$ are parallel

103. Two electric bulbs one of 200 volts-40 watt and the other of 200 volts-100 watt are connected in a house wiring circuit

(a) They have equal currents through them
(b) The resistance of the filament in 40 watt bulbs is more than the resistance in 100 watt bulb
(c) The resistance of the filament in both the bulbs is same
(d) The resistance of the filament in 100 watt bulb is more than the resistance in 40 watt bulb

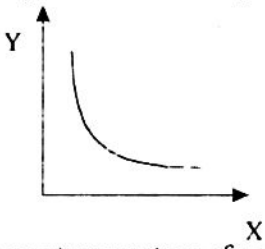
104. The line on which magnetic potential due to a bar magnet is zero is called

(a) Axial line (b) Magnetic equator
(c) Equatorial line (d) Isogonal line

105. The couple acting on a bar magnet kept in a magnetic field is maximum when the inclination with the field is

(a) 90° (b) 0°
(c) 45° (d) 180°

106. What physical quantities may X and Y represent? (*Y represents the first mentioned quantity*)



(a) Pressure versus temperature of a given gas (constant volume)
(b) Capacitance vs charge to give a constant potential
(c) Kinetic energy vs velocity of a particle
(d) Potential vs capacitance to give a constant charge

107. A charge q is placed at the centre of the line joining two equal charges Q. The system of the three charges will be in equilibrium if q is equal to

(a) $-\frac{Q}{2}$ (b) $+\frac{Q}{4}$

(c) $-\frac{Q}{4}$ (d) $+\frac{Q}{2}$

108. Laser light is considered to be coherent because it consists of

(a) Many wavelengths
(b) Coordinated waves of exactly the same wavelength
(c) Uncoordinated wavelengths
(d) Divergent beams

109. In Young's experiment for interference of light with two slits, reinforcement takes place when $\theta = \left(\frac{m\lambda}{d}\right)$ where d is the

(a) Distance from slits to screen
(b) Distance between slits

(c) Distance between dark and bright fringes
(d) Width of mth fringe

110. A thin film of air between a plane glass plate and a convex lens is irradiated with parallel beam of monochromatic light and is observed under a microscope, you will see
(a) Uniform brightness
(b) Field crossed over by concentric bright and dark rings
(c) Complete darkness
(d) Field crossed over by parallel bright and dark fringes

111. A cylindrical tube, open at both ends has a fundamental frequency in air. The tube is dipped vertically in water so that half of it is in water. The fundamental frequency of the air column is now

(a) $\frac{f}{2}$ (b) f

(c) $\frac{3f}{4}$ (d) $2f$

112. The frequency of vibration of string can be increased by
(a) Increasing the length of the string keeping the tension constant
(b) Increasing the thickness of the string keeping the length constant
(c) Decreasing the density of the string keeping the tension constant
(d) Decreasing the tension of the string keeping the length constant

113. The intensity of a sound wave while passing through an elastic medium falls down by 10% as it covers one meter distance through the medium. If the initial intensity of the sound wave was 100 db its value after it has passed through 3 meter thickness of the medium will be
(a) 70 ab (b) 81 ab
(c) 72.9 ab (d) 60 ab

114. A tuning fork when sounded together with a tuning fork of frequency 256 emits two beats. On loading the tuning frok of frequency 256 the number of beats heard is 1 per second. The frequency of first tuning fork
(a) 257 (b) 256
(c) 258 (d) 254

115. Two sound waves are $y = a \sin(\omega t - kx)$, $y = a \cos(\omega - kx)$. Phase difference between two waves is
(a) $\pi/2$ (b) $\pi/8$
(c) $\pi/4$ (d) $3\pi/4$

116. The unit of Planck's constant is
(a) Nm (b) Js^{-1}
(c) eV (d) Js

117. Sharavathy hydroelectric project is expected to produce about 1000 mW of power. This is equivalent to the conversion of a certain mass of matter into energy completely say in a reactor. This amount is
(a) 4 kg per second (b) 0.01 mg per second
(c) 4 tonns per hour (d) 10.2 mg per second

118. Light of wavelenth 600×10^{-9} metres has a frequency
(a) 1.8×10^4 Hz (b) 5×10^{14} Hz
(c) 3×10^8 Hz (d) 3×10^{10} Hz

119. A transformer steps up or steps down
(a) A.C. only (b) either A.C. or D.C
(c) D.C. only (d) A.C. mixed with D.C.

120. Kirchhoff's second law lis valid for
(a) Open circuit (b) Only parts of a circuit
(c) Circuits with cells only
(d) Closed circuit

CHEMISTRY

121. A dihalogen derivative (X) with three carbon atoms reacts with alcoholic KOH to give hydrocarbon (Y) which gives a white precipitate with ammonical $AgBO_3$(X). With aqueous KOH it gives a ketone, The compound (X) is
(a) 2, 2,-dichloropropane
(b) 1, 2-dichloropropene
(c) 1, 2-dichloropropane (d) 1, 3-dichloropropane

122. The highest boiling point is expected for
(a) 2, 2, 3, 3,-tetramethylbutene
(b) n-octane
(c) n-butane
(d) Iso-octane

123. A solution of KBr will liberate Br_2 with
(a) I_2 (b) Cl_2
(c) SO_2 (d) HI

124. The cathodic reaction in electrolysis of dilute H_2SO_4 with Pt electrode is
(a) Reduction (b) Both
(c) Oxidation (d) Neutralization

125. Chlorine reacts with benzaldehyde to give
(a) Chlorobenzene (b) Benzal chloride
(c) Benzoyl chloride (d) Benzyl chloride

126. The solubility of AgCl ($K_{sp} = 1.2 \times 10^{-10}$) in a 0.10 M NaCl solution is
(a) 1.2×10^{-10}M (b) 1.2×10^{-6} M
(c) 1.2×10^{-9} M (d) 0.1 M

127. The conjugate base of HBr is
(a) Br^- (b) H^+
(c) Br (d) H_2Br_3

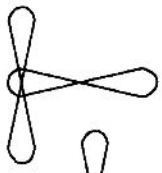
128. Which of the following statements is correct? Galvanic cell converts
(a) Metal from its element state changes to the combined state
(b) Electrical energy into chemical energy
(c) Electrolyte into identical ions
(d) Chemical energy into electrical energy

129. The cell potential of the galvanic cell, $Zn \mid Zn^{2+} \parallel Ag^{+} \mid Ag$, where $E^{\circ}_{Zn^{2+}/Zn} = -0.76V$; $E^{\circ}_{Ag^{+}/Ag} = +8.0V$ is
(a) –1.56 V (b) –0.04 V
(c) +1.56 V (d) 0.004 V

130. Oxidation number of Cl in $CaOCl_2$ is
(a) –2 (b) –1 and +1
(c) +2 (d) None of these

131. How many *g* are present in one mole of $MgSO_4$?
(a) 130.2 (b) 360
(c) 120.4 (d) 12.04

132. Which *p*-orbitals overlapping would give the strongest bond?

(a) 
(b) 
(c) 
(d) 

133. Which pair of the elements will have the same chemical properties?
(a) 3,11 (b) 13,22
(c) 2,4 (d) 4,24

134. The molecules of which of the following gas have highest speed?
(a) Nitrogen at 1000°C (b) Methane at 298 K
(c) Oxygen at 0°C (d) Hydrogen at –50°C

135. If $S_R + O_2(g) \rightarrow SO_2$ (g); $\Delta H = -71.1$ kcal .... (i)
$S_M + O_2(g) \rightarrow SO_2(g)$; $\Delta H = 71.7$ kcal ....(ii)
The heat of transition for $S_M \rightarrow S_R$ is ....
(a) –1.2 (b) – 0.6
(c) +1.2 (d) + 0.6

136. At constant P and T which of the following statement is correct for, $C(s) + O_2(g) \rightarrow CO_2$ (g)
(a) $\Delta H = \Delta E$ (b) $\Delta H < \Delta E$
(c) $\Delta H > \Delta E$
(d) ΔH is independent of the physical state of reactants

137. The $[H_3O^+]$ in the rain water of pH = 4.35 is
(a) 12.5×10^{-5} M (b) 6.5×10^{-5} M
(c) 9.5×10^{-5} M (d) 4.5×10^{-5} M

138. For the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at 500°C, the value of K_p is 1.44×10^{-5}. What will be the value of K_p at low pressure where the gases are behaving almost ideally
(a) $1.44 \times 10^{-5} \times (0.082 \times 773)^3$
(b) $(0.082 \times 773)^2 \times 1.44 \times 10^{-5}$
(c) $1.44 \times 10^{-5} \times (0.082 \times 500)^2$
(d) 1.44×10^{-5}

139. A reaction in which an increase in pressure will increase the yield of a products is
(a) $CO(g) + 3H_2(g) \rightleftharpoons CH_4(g) + H_2(g)$
(b) $NO(g) \rightleftharpoons \frac{1}{2}(g) + \frac{1}{2} O_2(g)$
(c) $H_2O + C(s) \rightleftharpoons CO(g) + H_2(g)$
(d) $Zn(s) + Cu^{2+}(aq.) \rightleftharpoons Cu(s) + Zn^{2+}(aq.)$

140. Platinised asbestos used as a catalyst in manufacture of H_2SO_4 is an example of
(a) Homogenous catalysis
(b) Heterogenous catalysis
(c) Induced catalysis
(d) Auto catalysis

141. The melting point of most of solid substances increase with an increase of pressure acting on them. However, ice melts at a temperature lower than its usual melting point, when the pressure increases. This is because
(a) Ice is not a true solid
(b) Ice is less denser than water
(c) The bonds break under pressure
(d) Pressure generates heat

142. The completely filled M shell of an atom contains in all
(a) 2e (b) 18 e
(c) 32 e (d) 8 e

143. The amount of sodium deposited by 5 ampere current for 10 minute from fused NaCl is
(a) 0.517 g (b) 71.5 g
(c) 5.17 g (d) 0.715 g

144. The compound that can work both as an oxidizing and reducing agent is
(a) $K_2Cr_2O_7$ (b) H_2O_2
(c) $Fe_2(SO_4)_3$ (d) $KMnO_4$

145. How many *g* of glucose should be dissolved to make one litre solution of 10% glucose
(a) 1.8 g (b) 180 g
(c) 100 g (d) 10 g

146. The elements in which electron enters to 3d orbitals
(a) 21 to 29 (b) 21 to 32
(c) 21 to 90 (d) 21 to 31

147. The projectile, that experiences minimum repulsion on approaching a particular nucleus is
(a) Neutron (b) α-particle
(c) Electron (d) β-particle

148. We can say that the energy of a photon of frequency v is given by $E = hv$, where h is planck's constant. The momentum of a photon is $p = h/\lambda$, where λ is the wavelength of photon, then we may conclude that velocity of light is equal to
(a) $(E/p)^2$ (b) E/p
(c) Ep (d) $(E/p)^{1/2}$

149. A balloon filled with methane CH_4 is pricked with a sharp point and quickly, plunged into a tank of hydrogen at the same pressure After sometime, the balloon will have
(a) Ethylene (C_2H_4) inside it
(b) Collapsed
(c) Remained unchanged in size
(d) Enlarged

150. A temperature in 0°C is converted into K
(a) By deducting 273.16 (b) By adding 200
(c) By adding 273.16
(d) By multiplying 273.16

151. When toluene is treated with acid $KMnO_4$, we get
(a) Benzene (b) Benzyl alcohol
(c) Benzaldehyde (d) Benzoic acid

152. Which of the following is least basic?
(a) $C_6H_5NH_2$ (b) $C_2H_5NH_2$
(c) $(CH_3H_5)_2NH$ (d) $(C_2H_5)_3N$

153. Which of the following on oxidation gives an acid containing two carbon atoms
(a) Ethyl amine (b) Ethyl nitrile
(c) Ethanamide (d) Ethanol

154. By passing acetic acid vapours over calcium oxide at 600 K, the compound obtained is:
(a) Acetone (b) Actaldehyde
(c) Acetic anhydride (d) Ethanol

155. The number of methoxy groups in a compound can be determined by treating it with
(a) Acetic acid (b) Sodium carbonate
(c) Sodium hydroxide (d) HI and $AgNO_3$

156. Iodoform when heated with silver powder, forms
(a) Ethyne (b) Ethane
(c) Ethene (d) Methane

157. The boiling point of n-alkanes is .... than the branched chain alkanes of the same molecular wieght
(a) More (b) Equal
(c) Less (d) None of these

158. When HCl gas is passed through propane in the presence of benzoyl peroxide, it gives
(a) Allyl chloride (b) 2-chloropropane
(c) n-propyl chloride (d) No reaction

159. Benzaldoxime exists in how many forms?
(a) 4 (b) 2
(c) 3 (d) 1

160. Reddish-brown (chocolate) ppt. are formed with:
(a) Pb^{2+} and I^- (b) Ba^{2+} and SO_4^{2-}
(c) Cu^{2+} and $Fe(CN)_6^{4-}$ (d) None of these

161 NH_3 does not form complex with
(a) AgBr (b) AgCl
(c) AgI (d) None of these

162. Which of the following halogen oxides is ionic?
(a) ClO_3 (b) I_2O_5
(c) BrO_2 (d) I_4O_9

163. The anhydride of pyroslphuric acid
(a) S_2O_7 (b) S_2O_3
(c) SO_3 (d) SO_2

164. The colourless gas liberated by passing excess of chlorine through NH_4 gas is
(a) N_2 (b) NCl_3
(c) H_2 (d) HCl

165. The metallic character of the element of IV B group
(a) Has no significance
(b) Increases from top to bottom
(c) Does not change
(d) Decrease from top to bottom

166. Colemanite is a mineral of
(a) Mn (b) B
(c) Al (d) Mg

167. Which is a transuranic element
(a) Francium (b) Fermium
(c) Rhodium (d) Promethium

168. Which loses weight on exposure to atmosphere?
(a) A saturated solution of CO_2
(b) Concentrated H_2SO_4
(c) Anhydrous sodium carbonate
(d) Solid NaOH

169. Pentalandite is an ore of
(a) Co (b) Cu
(c) Ni (d) Fe

170. The first ionization energy is smallest for the atom with electronic configuration
(a) ns^2np^6 (b) ns^2np^4
(c) $ns^2\ np^5$ (d) $ns^2\ np^3$

171. Which of the following liberates methane gas on treatment with water?
(a) Silicon carbide (b) Aluminium carbide
(c) Calcium carbide (d) Iron carbide

172. On heating sodium acetate with sodium hydroxide, the gas evolved will be
(a) Acetylene (b) Methane
(c) Ethane (d) Ethylene

173. Sodalime is extensively used in decarboxylation reaction to obtain alkanes. Sodalime is—
(a) NaOH (b) NaOH and CaO
(c) CaO (d) Na_2CO_3

174. Methyl bromide when heated with zinc in closed tube, produces
(a) Methane (b) Ethylene
(c) Ethane (d) Methanol

175. Wurtz reaction using bromoethane yields
(a) 2-bromobutane (b) Iso-butane
(c) *n*-butane (d) Ethane

176. Formation of alkane by the action of Zn on alkyl halide is called—
(a) Frankland reaction (b) Cannizzaro's reaction
(c) Wurtz reaction
(c) Kolbe's reaction

177. For the preparation of an alkane, a concentrated aqueous solution of sodium or potassium salt of a saturated carboxylic acid is subjected to—
(a) Hydrolysis (c) Hydrogenation
(c) Oxidation (d) Electrolysis

178. Which of the following compounds does not dissolve in conc. H_2SO_4 even on warming?
(a) Ethylene (b) Benzene
(c) Aniline (d) Hexane

179. Among paraffins, it is generally observed that with an increase in molecular weight—
(a) Freezing point decreases
(b) Boiling point increases
(c) Boiling point decreases
(d) Specific gravity decreases

180. As compared with the Boiling point of straight chain isomers the Boiling point of branched chain alkanes is—
(a) Lower (b) Equal
(c) Higher
(d) Independent of branching

☺☺☺