MATHEMATICS

1. If A=$\begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$, then A^4 =

   (1) 31 (2) 91 (3) 271 (4) 811

2. IF a $\begin{bmatrix} 0 & 2 & 1 \\ -2 & 0 & -2 \\ -1 & x & 0 \end{bmatrix}$ is a skew symmetric matrix, then the value of x is

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

3. What is the number of all possible matrices with entry as 0 or 1 if the order of matrices is 3x3

   (1) 64 (2) 268 (3) 512 (4) 256

4. If A=$\begin{bmatrix} 1 & i & -i \\ i & -i & 1 \\ -i & 1 & i \end{bmatrix}$, then $|A|$ =

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

5. The solution of a system of linear equation 2x-y+3z=9, x+y+z=6,x-y+z=2 is

   (1) x=-1,y=-2,z=-3 (3) x=2,y=1,z=3
   (2) x=3,y=2,z=-3 (4) x=1,y=2,z=3

6. if $\frac{1}{x^2+a^2}=\frac{A}{x+ai}+\frac{B}{x-ai}$ then A=_____ B=_____

   (1) $\frac{1}{2ai},\frac{1}{2ai}$ (2) $-\frac{1}{2ai},\frac{1}{2ai}$ (3) $\frac{1}{ai},\frac{1}{ai}$ (4) $-\frac{1}{ai},\frac{1}{ai}$

7. If $\frac{2x+4}{(x-1)^3}=\frac{A_1}{(X-1)}+\frac{A_2}{(X-1)^2}+\frac{A_3}{(X-1)^3}$ then $\sum_{i=1}^{3} A_i$ is equal to

   (1) A_2 (2) $2A_2$ (3) $4A_2$ (4) $4A_1$

8. The period of the function F(x) = $|\sin x|$ is

   (a) π (b) 2π (c) 3π (d) 4π

9. If A+B=45^0, then (1-cot A). (1-cotB) is

   (1) 1 (2) 0 (3) 2 (4) -1

10. The value of sin 78^0 + cos 132^0 is

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

11. If A+B+C=π, Then sin2A+sin2B+sin2C=

    (1) 4 cosA sinB cosC (3) 4 cosA cosB cosC
    (2) 4 sinA cosB sinC (4) 4 sinA sinB sinC

12. The principle solution of tanx=0 is

    (1) x=nπ,n$\in Z$ (3) X=(2n+1) $\pi/2$, n$\in Z$
    (2) x=0 (4) x=nπ+$\propto$, n$\in Z$

13. the value of Tan^{-1} (2) +Tan^{-1} (3) is

    (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{3\pi}{4}$

14. If the sides of a right angle triangle are in A.P, then the ratio of its sides is

    (1) 1:2:3 (2) 2:3:4 (3) 3:4:5 (4) 4:5:6

15. The value of $r.r_1.r_2.r_3$ is

    (1) Δ^2 (2) Δ^{-2} (3) Δ^3 (4) Δ^4

16. $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}$ =a

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(1) $\frac{1}{r}$ (2) $\frac{1}{2r}$ (3) $\frac{1}{R}$ (4) $\frac{1}{\Delta}$

17. If a=6, b=5, c=9, then the value of angle A is
    (1) Cos^{-1} (2/9) (3) Cos^{-1} (7/9)
    (2) Cos^{-1} (2/5) (4) Cos^{-1} (1/3)
18. The polar form of complex number 1-I is
    (1) $\sqrt{2}\, e^{-i\pi/4}$ (3) $\sqrt{2}\, e^{i\pi/2}$
    (2) $\sqrt{2}\, e^{i\pi/4}$ (4) $\sqrt{2}\, e^{-i\pi/2}$
19. If 1, ω, ω^2 be the cube roots of unity, then the value of$2^{\omega^3}.\, 2^{\omega^5}.2^{\omega}$ is
    (1) ω (2) ω^2 (3) 1 (4) 0
20. The intercept made on x-axis by the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is
    (1) $\sqrt{g^2} - c$ (3) $2\sqrt{g^2} - c$
    (2) $\sqrt{f^2} - c$ (4) $2\sqrt{f^2} - c$
21. If one end of the diameter of the circle $x^2 + y^2 - 5x - 8y + 13 = 0$ is (2,7). Then the order end of the diameter is
    (1) (3,1) (2) (1,3) (3) (-3,-1) (4) (-1,-3)
22. The radius of the circle $\sqrt{1 + m^2}\,(x^2 + y^2) - 2cx - 2mcy = 0$ is
    (1) 2c (2) 4c (3) c/2 (4) c
23. The parametric equations of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ is are
    (1) x=a sec θ , y=b tan θ (3) x= a cosec $\theta, y = b\ cot\theta$
    (2) x=b sin θ, y= a cos θ (4) x=acosec θ, y=bcot θ
24. the equations of the directions of the parabola $2x^2$=7y is
    (1) 8y+7=0 (3) 7y+8=0
    (2) 8y-7=0 (4) 8x-7=0
25. The condition for a straight line y=mx+c to be a tangent to the hyperbola $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is
    (1) C=a/m (3) $C^2=a^2\ m^2+b^2$
    (2) $C^2=a^2\ m^2-b^2$ (4) C^2 = a/m
26. $\lim_{x\to 1} \frac{\sqrt{5x-4}-\sqrt{x}}{x-1}$ is
    (1) 3 (2) 2 (3) 4 (4) 1
27. Log i-
    (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{4}$ (3) $\frac{i\pi}{2}$ (4) $\frac{i\pi}{4}$
28. $\frac{d}{dx}$ [$\log_7$ x]
    (1) $\frac{1}{x}$ (2) X $\log_7^e$ (3) $\frac{1}{x}\log_7^e$ (4) $\frac{1}{x}\log_e^7$
29. $\frac{d}{dx}$ [2cosh x] a
    (1) $\frac{e^x+e^{-x}}{2}$ (3) $e^x + e^{-x}$
    (2) $\frac{e^x-e^{-x}}{2}$ (4) $e^x - e^{-x}$ a
30. $\frac{d}{dx}\left[cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right]$
    (1) $\frac{1}{1+x^2}$ (2) $\frac{-1}{1+x^2}$ (3) $\frac{2}{1+x^2}$ (4) $\frac{-2}{1+x^2}$

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31. If $x=at^2$, $y=2at$, then $\frac{dy}{dx}=$

(1) $\sqrt{\frac{y}{x}}$ (2) $\sqrt{\frac{x}{a}}$ (3) $\sqrt{\frac{a}{x}}$ (4) $\sqrt{\frac{x}{y}}$

32. The derivative of e^x with respect to $\sqrt{x}$ is

(1) $\frac{2\sqrt{x}}{e^x}$ (2) $2\sqrt{x}\, e^x$ (3) $\frac{e^x}{2\sqrt{x}}$ (4) $\sqrt{x}.e^x$

33. The equation of the normal to the curve y= $5x^4$ at the point (1,5) is

(1) X+20y=99
(2) X+20y=101
(3) X-20y=99
(4) X-20y=101

34. The angle between the curves $y^2=4x$ and $x^2+y^2=5$ is

(1) $\frac{\pi}{4}$
(2) tan^{-1} (2)
(3) tan^{-1} (3)
(4) tan^{-1} (4)

35. If $u=x^3 y^3$ then $\frac{\partial^3 u}{\partial x^3}+\frac{\partial^3 u}{\partial y^3}=$

(1) $6\,(x^3+y^3)$
(2) $6\,x^3 y^3$
(3) $6\,x^3$
(4) $6\,y^3$

36. $\int \cos ex\, dx$

(1) Log (cosec x+ cot x)+c
(2) Log (cot x/2)+c
(3) Log (tan x/2)+c
(4) –cosec x.cot x +c

37. $\int_0^{\frac{\pi}{2}} cos^{11}\, x\, dx =$

(1) $\frac{256}{693}$ (2) $\frac{256\pi}{693}$ (3) $\frac{\pi}{4}$ (4) $\frac{128}{693}$

38. $\int f'(x).[f(x)]^n$ dx=

(1) $\frac{[f(x)]^{n-1}}{n-1}$+c
(2) $\frac{[f(x)]^{n+1}}{n+1}$+c
(3) $n[f(x)]^{n+1}$+c
(4) $n+1\,[f(x)]^{n+1}$+c

39. $\int \frac{dx}{(x+7)\sqrt{x+6}}$

(1) $Tan^{-1}\sqrt{x+6}+c$
(2) $2Tan^{-1}\sqrt{x+6}+c$
(3) Tan^{-1} (x+7)+c
(4) $2Tan^{-1}$ (x+7)+c

40. $\int tan^{-1}x dx$

(1) $X.Tan^{-1}x+\frac{1}{2}\log(1+x^2)$+c
(2) $\frac{1}{1+x^2}$+c
(3) x^2. Tan^{-1}x+c
(4) $x\, tan^{-1}x-\log\sqrt{1+x^2}$ +c

41. $\int \frac{dx}{1+e^{-x}}$

(1) $\log(1+e^{-x})$+c
(2) $\log(1+e^{x})$+c
(3) e^{-x}+c
(4) e^{x}+c

42. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin|X|$dx

(1) 0 (2) 2 (3) 1 (4) -1

43. Area under the curve f(x) =sinx in $[0,\pi]$ is

(1) 4 sq. units
(2) 2 sq. units
(3) 6 sq. units
(4) 8 sq. units

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44. The order of $x^3\frac{d^3y}{dx^3}+2x^2\frac{d^2y}{dx^2}-3y=x$

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

45. The degree of $\left[\frac{d^3y}{dx^3}+\left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}}=\frac{d^2y}{dx^2}$

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

46. The family of straight lines passing through the origin is represented by the different equation

(1) ydx+xdy=0
(2) ydx-xdy=0
(3) xdx+ydy=0
(4) xdx-ydy=0

47. the different equation $\frac{dy}{dx}+\frac{ax+hy+g}{hx+by+f}$=0 is called

(1) homogeneous
(2) exact
(3) linear
(4) legender

48. the solution of differential equation $\frac{dy}{dx}=e^{-\frac{2}{x}}$-2xy is

(1) y$e^{-\frac{2}{x}}$=x+c
(2) ye^{x}=x+c
(3) y$e^{\frac{2}{x}}$=x+c
(4) y=x+c

49. the complementary function of (D^3+D^2+D+1) y=10 is

(1) c_1 cosx +c_2 sinx+ $c_3\,e^{-x}$
(2) c_1 cosx +c_2 sinx+ c_3e^{x}
(3) c_1+c_2 cosx +c_3 sinx
(4) (c_1+c_2x+ $c_3\,x^2$) e^{x}

50. Particular integral of $(D-1)^4$ y=e^{x} is

(1) x^4e^{x} (2) $\frac{x^4}{24}e^{-x}$ (3) $\frac{x^4}{12}e^{x}$ (4) $\frac{x^4}{24}e^{x}$

PHYSICS

51. Two quantities A and B are related the relation A/B=m where m is linear mass density and A is force. The dimensions of B will be

(1) Same as that of latent heat
(2) Same as that of pressure
(3) Same as that of work
(4) Same as that of momentum

52. The dimensional formula of capacitance in terms of M,L,T and l is

(1) $[ML^2T^2L^2]$
(2) $[ML^{-2}T^2L^2]$
(3) $[M^{-1}L^3T^3L]$
(4) $[M^{-1}L^{-2}T^2L^2]$

53. If l,m and n are the direction cosines of a vector, then

(1) L+m+n=1
(2) $l^2+m+^2n^2=1$
(3) $\frac{l}{l}+\frac{1}{m}+\frac{1}{n}$=1
(4) $lmn=1$

54. The angle between i+j and j+k is

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

55. A particle is moving eastwards with a velocity of 5 ms^{-1},in 10 seconds the velocity changes to 5 ms^{-1} northwards. The average acceleration in this time is

(1) $\frac{1}{\sqrt{2}}$, ms^{-2} towards north-west
(2) zero

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(3) $\frac{1}{2}$, ms^{-2} towards north (4) $\frac{1}{\sqrt{2}}$, ms^{-2} towards north-east

56. The linear momentum of a practice varies with time 1 as $p=a + bt + ct^2$ which of the following is correct?
    (1) Force varies with time in a quadratic manner.
    (2) Force is time-dependent
    (3) The velocity of the particle is proportional to time
    (4) The displacement of the particle is proportional to t
57. A shell of mass m moving with a velocity v suddenly explodes into two pieces. One part of mass m/4 remains stationary. The velocity of the other part at is
    (1) V (2) 2v (3) 3v/4 (4) 4v/3
58. The velocity of a freely falling body after 2s is
    (1) 9.8 ms^{-1} (3) 18.6 ms^{-1}
    (2) 10.2 ms^{-1} (4) 19.6 ms^{-1}
59. A large number of bullets are filled in all directions with the same speed u. the maximum area on the ground on which these bullets will spread is
    (1) $\frac{\pi u^2}{g^2}$ (2) $\frac{\pi u^4}{g^2}$ (3) $\frac{\pi u^2}{g^4}$ (4) $\frac{\pi u}{g^4}$
60. The minimum stopping. Distance for a car of mass m, moving with a speed v along a level road, if the coefficient of friction between the tyres and the road is μ , will be
    (1) $\frac{v^2}{2\mu g}$ (2) $\frac{v^2}{\mu g}$ (3) $\frac{v^2}{4\mu g}$ (4) $\frac{v}{2\mu g}$
61. When a bicycle is in motion, the force of friction excreted by the ground on the two wheels is such that it acts
    (1) In the backward direction on the front wheel and in the forward direction on the rear wheel
    (2) In the forward direction on the front wheel and in the backward direction on the rear wheel
    (3) In the backward direction on both the front and the rear wheels.
    (4) In the forward direction on both the front and the rear wheels.
62. In a perfectly inelastic collision, the two bodies.
    (1) Strike and explode (3) Implode and explode
    (2) Explode without striking (4) Combine and move together
63. Under the reaction of a constant force, a particle is expiring a constant acceleration, then the power is
    (1) Zero (3) Negative
    (2) Positive (4) Increasing uniformly with time
64. Consider the two following statements :
    A: Linear momentum of a system of particles in zero
    B: Kinetic energy of a system of particles is zero then
    (1) A implies B & B implies A
    (2) A does not imply B and B does not imply A
    (3) A implies B but B does not imply A
    (4) A does not imply B but B implies A
65. An example develops 10 kW of power. How much time will it taken to lift a mass of 200 kg to a height of 40 m? (given g=10 ms^{-2})
    (1) 4s (2) 5s (3) 8s (4) 10s

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66. If a spring has time period T, and is cut into n equal parts, then the period will be
(1) T $\sqrt{n}$
(2) $\frac{T}{\sqrt{n}}$
(3) nT
(4) T

67. When temperature increases, the frequency of a tuning fork
(1) Increases
(2) Decreases
(3) Remains same
(4) Increases or decreases depending on the material

68. If a simple harmonic motion is represented by $\frac{d^2x}{dy^2}$+ax=0, its time period is
(1) $2\pi\sqrt{\propto}$
(2) $2\pi \propto$
(3) $\frac{2\pi}{\sqrt{\propto}}$
(4) $\frac{2\pi}{\propto}$

69. A cinema hall has volume of 7500 m^3 it is required to have reverbertation time of 1.5 seconds. The total absorption in the hall should be
(1) 850 w-m^2
(2) 82.50 w-m^2
(3) 8.250 w-m^2
(4) 0.825 w-m^2

70. To absorb the sound in a hall which of the following are used
(1) Glasses, stores
(2) Carpets, curtains
(3) Polished surfaces
(4) Platforms

71. If N represents avagardo's number, then the number of molecules in 6 gm of hydrogen at NTP is
(1) 2N
(2) 3N
(3) N
(4) N/6

72. The mean translational kinetic energy of a perfect gas molecule at the temperature TK is
(1) $\frac{1}{2}$ k T
(2) kT
(3) $\frac{3}{2}$ kT
(4) 2kT

73. The amount of heat given to a body which raises its temperature by 1^0c
(1) Water equivalent
(2) Thermal heat capacity
(3) Specific heat
(4) Temperature gradient

74. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio c/p/cv for gas is
(1) $\frac{3}{2}$
(2) $\frac{4}{3}$
(3) 2
(4) $\frac{5}{3}$

75. Cladding in the optical fiber is mainly used to
(1) To protect the fiber from mechanical stresses
(2) To protect the fiber from corrosion
(3) To protect the fiber from mechanical strength
(4) To protect the fiber from electromagnetic guidance

CHEMISTRY

76. The valency electric configuration of phosphorous atom (at. No. 15) is
(1) $3s^2\ 3p^3$
(2) $3s^1\ 3p^3\ 3d^1$
(3) $3s^2\ 3p^2\ 3d^1$
(4) $3s^1\ 3p^2\ 3d^2$

77. An element 'A' of at. No. 12 combines with an element 'B' of at. no. 17. The compound formed is

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(1) C
(2) ovalent AB
(3) Ionic AB2
(4) Covalent AB2
(5) Ionic AB

78. The number of neutrons presented in the atom of $56^{Ba^{137}}$ is
(1) 56 (2) 137 (3) 193 (4) 81

79. Hydrogen bonding in water molecule is responsible for
(1) Decrease in freezing point
(2) Increase in its degree of ionization
(3) Increase in its boiling point
(4) Decrease in its boiling point

80. In the HCL molecule, the bonding between hydrogen and chlorine is
(1) Purely covalent
(2) Purely ionic
(3) Polar covalent
(4) Complex coordinate

81. Potassium metal and potassium ions
(1) Both react with water
(2) Have the same number of protons
(3) Both react with chlorine gas
(4) Have the same electronic configuration

82. 5.85 gms of sodium chloride were dissolved in water and the solution made upto 100 ml in a standard flask. 10 ml of this solution were pipetted out into another flask and made up with distilled water into 1200 ml of solution .the concentration of the sodium chloride solution now is
(1) 0.1 M (2) 1.0 M (3) 0.5 M (4) 0.25 M

83. Concentration of a 1.0 M solution of phosphoric acid in water is
(1) 0.33 N (2) 1.0 N (3) 2.0 N (4) 3.0 N

84. Which of the following is a lewis acid?
(1) Ammonium
(2) Beryllium chloride
(3) Boron trifluoride
(4) Magnesium oxide

85. Which of the following constitutes the components of a buffer solution
(1) Potassium acetate and acetic acid
(2) Sodium acetate and acetic acid
(3) Magnesium sulphate and sulphuric acid
(4) Calcium chloride and calcium acetate

86. Which of the following is an electrolyte?
(1) Acetic acid
(2) glucose
(3) urea
(4) pyridine

87. calculate the standard emf of the cell, $cd/cd^{+2}/cu^{+2}/cu$ given that $E^0 cd/cd^{+2}=0.44v$ and $E^0 cu/cu^{+2}=(-)\ 0.34$ v
(1) (-) 1.0 v
(2) 1.0 v
(3) (-) 0.78 v
(4) 0.78 v

88. A solution of nickel chloride was electrolyzed using platinum electrodes. After electrolysis
(1) Nickel will be deposited on the anode
(2) CL_2 gas will be liberated at the cathode
(3) H_2 gas will be liberated at the anode
(4) Nickel will be deposited on the cathode

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89. Which of the following metals will undergo oxidation fastest ?
(1) Cu
(2) Li
(3) Zinc
(4) Iron

90. Which of the following cannot be used for the sterilization of drinking water?
(1) ozone
(2) Calcium oxychloride
(3) Potassium chloride
(4) Chlorine water

91. A water sample showed it to contain 1.20 mg/litre of magnesium sulphate. Then, its hardness in terms of calcium carbonate equivalent is
(1) 1.0 ppm
(2) 1.20 ppm
(3) 0.60 ppm
(4) 2.40 ppm

92. Soda used in the L-S process softening of water is, chemically.
(1) Sodium bicarbonate
(2) Sodium carbonate decahydrate
(3) Sodium carbonate
(4) Sodium hydroxide (40%)

93. The process of cementation with zinc powder is known as
(1) Shearardizing
(2) Zincing
(3) Metal cladding
(4) Electroplating

94. Corrosion of a metal is fastest is fastest in
(1) Rain-water
(2) Acidulated water
(3) Distilled water
(4) De-ionised water

95. Which of the following is a thermoset polymer?
(1) Polystyrene
(2) PVC
(3) Polythene
(4) Urea-formaldehyde resin

96. Chemically, neoprene is
(1) Polyvinyl benzene
(2) Polyacetylene
(3) Polychloroprene
(4) Poly-1, 3-butadiene

97. Vulcanization involves heating of raw rubber with
(1) Selenium element
(2) Elemental sulphur
(3) A mixture of se and elemental sulphur
(4) A mixture of selenium and sulphur dioxide

98. Petrol largely contains
(1) A mixture of unsaturated hydrocarbons C_5-C_8
(2) A mixture of benzene, toluene and xylene
(3) A mixture of saturated hydrocarbons C_{12}-C_{14}
(4) A mixture of saturates hydrocarbons C_6-C_8

99. Which of the following gasses is largely responsible for acid-rain?
(1) SO_2 & NO_2
(2) CO_2& water vapour
(3) CO_2 &N_2
(4) N_2 & CO_2

100. BOD stands for
(1) Biogenetic oxygen demand
(2) Biometric oxygen demand
(3) Biological oxygen demand
(4) Biospecific oxygen demand

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