Mathematics   **40X1=40**

1.   For any two square matrices A and B, which one of the following is a symmetric matrix?

   (a) A - A^T (b) A+A^T (c) $(A^T)^T$ (d) none

2.   In how many ways can 5 different beads be strung on a necklace?

   (a) 12   (b) 16   (c) 20   (d) 24

3.   Which of the following statements is correct?

   (a) $ln0=1$ (b) $ln1=\infty$

   (c) $ln(1+2+3)=ln1+ln2+ln3$ (d) $ln(2+3+4)=ln2+ln3+ln4$

4.   If $sinA= sinB= sinC$ and $a= R=4\ cm$ then area of triangleABC is

   (a) 4 sq cm   (b) 6 sq cm   (c) 8 sq cm   (d) 10 sq cm

5.   Point of intersection of altitudes of a triangle is called

   (a) centroid   (b) orthocentre   (c) circumcentre   (d) incentre

6.   For what value of a the points (0,3), $(a,1)\ and\ (2,-1)$ will be collinear?

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

7.   The perpendicular distance between the parallel lines $3x-4y+5=0$ and $3x-4y-5=0$ is

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

8.   Two lines represented by $ax^2+2hxy+by^2+2gx+2fy+c=0$ are parallel if

   (a) $h^2=ab$ (b) $h^2<ab$ (c) $h^2>ab$ (d) $h^2\geq ab$

9.   The equations $x=a\ cos\theta$, $y=a\ sin\theta$ together represent

   (a) an hyperbola   (b) an ellipse   (c) a parabola   (d) a circle

10. The distance of a point (2,3,4) from the x-axis is
    (a) 2   (b) 3   (c) 4   (d) 5

11. If A=(-3, 4) and B = [2, 6] then A ∩ B is

    (a) (2,4)   (b) (2, 4)   (c) (2, 4)   (d) [2,4]

12. The expression |2x + 1| < 3 is same as

    (a) - 2 < x < - 1   (b) - 2 < x < 1   (c) 2 < x < 3   (d) - 1 < x < 2

13. In the series 1+6+11+16+ the eighth term is

    (a) 36   (b) 48   (c) 32   (d) 39

14. The line $y=mx+c$ will be a tangent to a parabola $y^2=4ax$ if

    (a) $c < \frac{a}{m}$ (b) $c = \frac{a}{m}$ (c) $c > \frac{a}{m}$ (d) $c \geq \frac{a}{m}$

15. $\lim\limits_{x \to \infty} \frac{ax^3+bx+c}{px^2+qr+r} =$

    (a) ∞ (b) 0   (c) $\frac{a}{p}$ (d) $\frac{c}{r}$

16. The maximum value $f(x)=x-\frac{x^2}{2}$ is

    (a) 0   (b) 12   (c) 1   (d) 2

17. If $f(x)= \int_0^x x\,dx$ then $f(4)=$

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

18. The equation of the circle with the end points of diameter (3,4) and (−3,−4) is
    a. $x^2 + y^2 − x + 3 = 0$
    b. $x^2 + y^2 − 4x + 2y + 1 = 0$
    c. $x^2 + y^2 = 49$
    d. $x^2 + y^2 = 25$

19. Evaluate: $\lim\limits_{x \to 3} \frac{|x-3|}{x-3}$

    a. 1   b. −1   c. 3   d. does not exist

20. The ratio in which the line segment joining the points (2, 6) and (5, −4) is divided by x-axis is

    a. 1: 1   b. 2: −5   c. 3: 2   d. 4: 5
21. Sum of the roots of quadratic equation $3x^2 -9x+5=0$

(a) 3   (b) 6   (c) -3   (d) 2

22. $[a, b] =$

(a) $\{x : a \leq x \leq b\}$
(b) $\{x : a < x < b\}$
(c) $\{x : a < x \leq b\}$
(d) $\{x : a \leq x < b\}$

23. The quadratic equation whose roots are -3 and 2 is

(a) $x^2 + x - 6 = 0$ (b) $x^2 + x + 6 = 0$ (c) $x^2 - x - 6 = 0$ (d) $x^2 - x + 6 = 0$

24. Which of the following cannot be the equation of circle?

(a) $x^2 + y^2 - 7 = 0$
(b) $x^2 + xy + y^2 = 5$
(c) $x^2 + y^2 - 7x + 5y = 2$
(d) $x^2 + y^2 = 3x - 2y + 4$

25. The equation of tangent to the circle $x^2 + y^2 = 9$ at $(1, 1)$ is

(a) $x + y = 9$
(b) $x - y = 9$
(c) $2x + 2y = 9$
(d) $-x - y = 9$

26. If $f(x-1)=x+3$ then $f(x^2)=$

(a) x^2 (b) x^2+3 (c) x^2+4 (d) x^2-1

27. In how many ways 6 students be seated in a round table?

(a) 720   (b) 360   (c) 120   (d) 60

28. The value of $4(xy)^3+(x^3-y^3)^2$ is:

(a) $(x^3-y^3)^2$ (b) $(x^3+y^3)^2$ (c) (x^3+y^3) (d) (x^3-y^3)

29. If $^nP_2 = 12$ then value of n is

(a) 5   (b) 4   (c) 6   (d) 3

30. The maximum value of $f(x)=1+\sin x+\cos x$ is

(a) 2   (b) $\sqrt{2} + 1$ (c) $\sqrt{2}$ (d) $2\sqrt{2}$

31. $\int Cotx\,dx =$

(a) -cosec2x   (b)log(tanx)   (c)log(sinx)   (d)log(cosx)

32. The area of triangle ABC is

(a) $2b$ sinA   (b) bc sinA   (c) $\frac{1}{2} bcsinA$ (d) $\frac{1}{2} acsinA$

33. $\lim\limits_{x \to 3} \frac{x^3-27}{x-3} =$

(a) 3   (b) 9   (c) 27   (d) 0/0

34. If A= $\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$ then AA^T=

(a)0   (b)I   (c)A   (d)A^T

35. $\lim\limits_{x \to \infty} \frac{sinx}{x} =$

(a) 1   (b)-1   (c)0   (d)cannot be found

36. Calculate the mean of the given data set:
3,8,12,17,16,14,6,8,16,10 is

(a) 11   (b) 12   (c) 13   (d) 14

37. What is the probability of getting 1 and 5 if a dice is thrown once?

(a) 1/6   (b)1/3   (c)2/3   (d)1/36

38. The scalar product of two vectors 3i – 4j + k and 3i + 4j is

(a) 6   (b) –7   (c) 0   (d) –7i

39. The value of $\begin{vmatrix} 0 & 2 & 3 \\ 1 & 2 & 3 \\ 4 & 8 & 12 \end{vmatrix}$

(a) 10   (b) 1   (c) 0   (d) -1

40. If the function $f(x) = \begin{cases} 3x - 4, & x \le 2 \\ 2x + k, & x > 2 \end{cases}$ is continuous at x=2, then the value of k is

(a) 2   (b) -2   (c) 4   (d) -4

Physics   30X1=30

41. A stone is dropped from a height of 45 m. The distance travelled by it during its last second is

(a) 5 m.   (b) 10 m.   (c) 25 m.   (d) 50 m.

42. A vector is multiplied by -2 then

   (a) Direction reverses and unit changes.
   (b) Direction reverses and magnitude is doubled.
   (c) Direction remains unchanged but unit changes.
   (d) Neither direction reverses nor unit changes but magnitude is doubled.

43. Sweetness of sound depends upon its

   (a) Wavelength   (b) periodicity   (c) periodicity and regulator   (d) amplitude

44. A source of 34 V and 50 Hz is connected in series with coil of 17 mH and resistor of   10W. The potential difference across the coil is

   (a) 12 V   (b) 16 V   (c) 28 V   (d) 32 V

45. When objects placed in a room are exposed to X-rays, they appear

   (a) Invisible   (b) yellow   (c) blue   (d) red

46. In P-type semiconductor, the majority and minority charge carriers are respectively

   (a) Protons and electrons
   (b) Electrons and protons
   (c) Electrons and holes
   (d) Holes and electrons

47. Sound waves differ from light waves because they do not exhibit the phenomenon of

   (a) refraction   (b) interference   (c) diffraction   (d) Polarization

48. A string stretched at both ends is under a tension of 100 N. If mass of string is 4 X 10-6 kg/cm, the velocity of transverse waves in string is

   (a) 330 m/s   (b) 50 m/s   (c) 500 m/s   (d) 5000 m/s

49. The minimum distance between an object and its real image formed by a thin convex lens of focal length 'f' is

   (a) 4f   (b) 2f   (c) f   (d) f/2

50. The phenomenon of photo electric effect was explained by

   (a) Planck   (b) Maxwell   (c) Einstein   (d) Bohr

51. Which one of the following properties of an element is not variable?

   (a) Valiancy   (b) Atomic mass   (c) equivalent mass   (d) all of the above

52. A string stretched at both ends is under a tension of 100 N. If mass of string is 4 X 10-6 kg/cm, the velocity of transverse waves in string is

(a)330 m/s   (b) 50 m/s   (c) 500 m/s   (d) 5000 m/s

53. A gas is termed an ideal gas if it obeys the equation of state PV = nRT. Other show deviation from ideality,

(a) At low pressure
(b) At low temperature
(c) At low pressure and high temperature
(d) At high pressure and low temperature

53. The surface tension of soap solution is 25 x 10^{-3} N/m. The excess pressure inside a soap bubble of diameter 1cm is

(a) 5 Pa   (b) 10 Pa   (c) 20 Pa   (d) 40 Pa

54. Water rises to a height of 4 cm in a capillary tube. If the area of cross-section of the tube is reduced to 1/16 of the former value, water will rise to a height of

(a) 8 cm   (b) 16 cm   (c) 24 cm   (d)32 cm

55. On a thermometer, the freezing point of water is marked as 20° and the boiling point of water is marked as 150°. A temperature of 60°C will be read on this thermometer as

(a) 58°   (b) 80°   (c) 98°   (d) 110°

56. According to the kinetic theory of gases

(a) the pressure of a gas is proportional to the rms speed of the molecules
(b) the rms speed of the molecules of a gas is proportional to the absolute temperature
(c)the pressure of a gas is proportional to the square of the rms speed of the molecules
(d) the rms speed of the molecules of a gas is inversely proportional to the square root of the absolute   temperature

57. An air bubble inside a glass slab (µg = 1.5) appears to be 6 cm deep when viewed from one side and 4 cm deep when viewed from the opposite side. The thickness of the slab is

(a) 5.4 cm   (b) 6.67 cm   (c) 10 cm   (d) 15 cm

58. All of the following statements are correct except

(a)The image formed by a concave mirror is real, inverted and magnified when the object is placed beyond   the centre of curvature.

(b) The image formed by a concave mirror is real, inverted and equal in size when the object is placed at the centre of curvature.

(c) The image formed by a concave mirror is virtual, erect and magnified when the object is placed between the focus and the mirror.

(d) The image formed by a concave mirror is real, inverted and magnified when the object is placed between the centre of curvature and the focus.

59. A parallel plate capacitor is charged and the charging battery is then disconnected. If the plates of the capacitor are moved farther apart by means of insulating handles

(a) the charge on the capacitor increases
(b) the voltage across the plates increases
(c) the capacitance of the capacitor increases
(d) the energy stored in the capacitor decreases

60. Which of the following does not affect the motion of a moving electron?

(a) Electric field applied in the direction of motion
(b) Magnetic field applied in the direction of motion
(c) Electric field applied perpendicular to the direction of motion
(d) Magnetic field applied perpendicular to the direction of motion

61. X-ray region lies between

(a) visible and ultraviolet regions
(b) gamma rays and ultraviolet regions
(c) short radio waves and visible regions
(d) short radio waves and long radio waves

62. Fusion reaction takes place at high temperature because

(a) nuclei break up at high temperature
(b) atoms are ionized at high temperature
(c) molecules break up at high temperature
(d) kinetic energy is high enough to overcome repulsion at high temperature

63. 63.In the use of transistor as an amplifier

(a)both the junctions are forward biased
(b) any of the two junctions may be forward biased
(c) the emitter-base junction is forward biased and collector-base junction is reverse biased
(d) the emitter-base junction is reverse biased and collector-base junction is forward biased

64. On heating a liquid, the refractive index generally

(a) Does not change   (b) decreases
(c) Increases   (d) May increase or decrease depending on the rate of heating

65. A bullet fired into a fixed target loses half of its velocity after penetrating 3 cm, the further distance travelled before coming to the rest is

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

66. In P-type semiconductor, the majority and minority charge carriers are respectively

    (a) Protons and electrons
    (b) Electrons and protons
    (c) Electrons and holes
    (d) Holes and electrons

67. A string stretched at both ends is under a tension of 100 N. If mass of string is 4×10^{-6} kg/cm, the velocity of transverse waves in string is

    (a) 330 m/s   (b) 50 m/s   (c) 500 m/s   (d) 5000 m/s

68. The minimum distance between an object and its real image formed by a thin convex lens of focal length 'f' is

    (a) 4f   (b) 2f   (c) f   (d) f/2

69. The angle of prism is 30°. The ray incident at 60° at one refracting face suffers a deviation of 30°. Then the angle of emergence is

    (a) 0° (b) 30° (c) 60° (d) 90°

70. The unit of pole strength is
    (a) Amp-metre^2 (b) Amp-meter   (c) Amp/meter   (d) Amp/meter ^{2}

Chemistry   20X1=20

71. How many gm moles oxygen are there in 88 gms carbon di oxide?

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

72. During electrolysis of NaCl, the gas discharged at the anode is

    (a)Chlorine   (b)Hydrogen   (c)Oxygen   (d)None of these.

73. You should never taste or touch to identify a base because they can be

    (a)Corrosive   (b)slippery   (c) Sour   (d) Antacids

74. Avogadro Number is represented by
    (a) Ao   (b) Ma   (c)NA   (d)AN

75. What is the oxidation number of Cl in ClO_3^- ?
    (a) + 5   (b)-2   (c)-6   (d)+4

76. The common name of ethyne is

(a) acetylene   (b) ethyl alcohol
(b) methane   (d) ethanol

77. Which of the following suffix is used to name hydrocarbons with double bond by IUPAC system

(a)ene   (b)ane   (c)yne   (d) ol

78. The chemical formula of copper pyrite is

(a) CuS_2Fe (b) $CuFeS_2$ (c) Cu_2FeS (d)$(CuFe)_2S$

79. The purest form of iron is

(a) cast iron   (b) pig iron   (c)wrought iron   (d) steel

80. Ammonia can be dried by

(a)Conc. H_2SO_4
(b) P_2O_5
(c) Anhydrous $CaCl_2$
(d) None of above

81. The structure of CO_2 molecule is

(a) Linear   (b) tetrahedral   (c) angular   (d) pyramidal

82. Al_4C_3 reacts with water to give

(a) CH_4 (b) C_2H_2 (c) H_2 (d) C_2H_4

83. Which of the following compound is most basic?

(a) NH_3 (b) CH_3NH_2 (c) $(CH_3)_2NH$ (d) $(CH_3)_3N$

84. Which of the following is an intensive property?

(a) Volume   (b) mass   (c) area   (d) concentration

85. An example of acidic oxide is

(a) NO   (b) N_2O5 (c) N_2O (d) Al_2O_3

86. Ammonia is manufactured by

(a) Haber's process   (b) Contact process   (c) Down's process   (d) Ostwald's process

87. How does a catalyst change during a reaction?

(a) Physically   (b) Mass-wise   (c) Chemically   (d) Quantitatively

88. Fat is a

(a) Lipid　　　　　　(b) carbohydrate　　　　　(c) protein　　　　　(d) amino acid

89. The conversion of lead carbonate to lead sulphate is

(a)Oxidation　　　　　　　　(b) reduction

(c) Both oxidation and reduction　　　　(d) neither oxidation nor reduction

90. Cinnabar is an ore of

(a) Zinc　　　　　　(b) copper　　　　　(c) mercury　　　　　(d) iron

91. She asked me …………….. help with the project.

　(a) to　　　　　(b) for　　　　　(c) about　　　　　(d) with

92. Suganya ____ yesterday.

　(a) came not　　(b) didn't come　　(c) hadn't come　　(d) hasn't come

93. If I_____to Kathmandu, i'll visit the zoo.

　(a) go　　　　　(b) went　　　　　(c) had gone　　　　　(d) goes

94. My father enjoys …………….. his car on weekends.

　(a) to wash　　(b) washing　　(c) wash　　　　　(d) washed

95. Choose the correct synonym of the given word: Perspicacious
　(a) bad　　　(b) clear　　　　(c) hazy　　　　　(d) shrewd

96.Choose the correct synonym of the given word: Paramount
　a) very important
　b) wide and extensive
　c) above others in rank of authority
　d) famous

97. He said that he …………….. his homework already.

　(a) finished　　(b) has finished　　(c) will finish　　(d) finishing

98.　He didn't go to the party …………….. he was sick.

(a) because　　(b) though　　　　(c) so　　　　　(d) but

　99. The book …………….. on the table is mine.

(a) laying　　　　　(b) lie　　　　　(c) laying　　　　　(d) lying

100. She is ……………... best student in the class.

(a) a   (b) an   (c) the   (d) none of the above