SECTION-I

Select the best alternatives: (60 ×1 = 60)

1. Which of the following is an open statement
   a. x is a natural numbers
   b. Give me a glass of water
   c. Wish you best of luck
   d. Good morning to all

2. If A, B and C are any three sets, then A - (B ∪ C) is equal to
   a. (A-B)∪(A-C) b. (A-B)∩(A-C)
   c. (A-B)∩C d. (A-B)∪C

3. If $A = \begin{bmatrix} 2 & 1 & 3 \\ -2 & 1 & 4 \\ 9 & -12 & 2 \end{bmatrix}$ then ratio of minor to co factor of the element a_{23} is
   a. 4 b. -4
   c. 1 d. -1

4. $(1+i)^6 + (1-i)^6 =$
   a. 2^6 b. 2^7
   c. 0 d. -2^7

5. The roots of the equation $a(x^2+1) - (a^2+1)x=0$ are
   a. $a, \frac{1}{a}$ b. a, 2a
   c. $a, \frac{1}{2a}$ d. $\frac{1}{a}, \frac{1}{2a}$

6. $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} \pm \ldots =$
   a. ln 2 b. log 2
   c. - ln 2 d. - log 2

7. The coefficient of x^3y^4 in $(2x+3y^2)^5$ is
   a. 360 b. 720
   c. 240 d. 1080

8. If tan mθ=tan nθ, then the general value of θ will be in
   a. AP b. GP
   c. HP d. AGP

9. A, B, C are the angles of a triangle, then $\sin^2A+\sin^2B+\sin^2C-2\cos A\cos B\cos C=$
   a. 1 b. 2
   c. 3 d. 4

10. The equation of the line perpendicular to the line $\frac{x}{a} - \frac{y}{b} = 1$ and passing through the point at which it cuts x-axis, is
    a. $\frac{x}{a} + \frac{y}{b} + \frac{a}{b} = 0$ b. $\frac{x}{a} + \frac{y}{b} - \frac{a}{b} = 0$
    c. $\frac{x}{a} + \frac{y}{b} = 0$ d. $\frac{x}{b} + \frac{y}{a} - \frac{a}{b} = 0$

11. The equation of the lines passing through the origin and having slopes 3 and -1/3 is
    a. $3y^2+8xy-3x^2=0$
    b. $3x^2+8xy-3y^2=0$
    c. $3y^2-8xy+3x^2=0$
    d. $3x^2+8xy+3y^2=0$

12. If the line x+2by+7=0 is a diameter of the circle $x^2+y^2-6x+2y=0$, then b=
    a. 3 b. -5
    c. -1 d. 5

13. If α, β, γ are the direction angles of a line then the value of $\cos2\alpha + \cos2\beta + \cos2\gamma =$
    a. 1 b. –1
    c. 2 d. 0

14. The equation of the plane which is parallel to y-axis and cuts off intercepts of length 2 and 3 from x-axis and z-axis is
    a. 3x+2z=1 b. 3x+2z=6
    c. 2x+3z=6 d. 3x+2z=0

15. The integral $\int \sin(\log x)\,dx$ is equal to
    a. $\frac{1}{2}x[\cos(\log x) - \sin(\log x)]$
    b. $\cos(\log x) - x$
    c. $\frac{1}{2}x[\sin(\log x) - \cos(\log x)]$
    d. $-\cos(\log x)$

16. $x\sqrt{1+y} + y\sqrt{1+x} = 0$, then $\frac{dy}{dx} =$
    a. 1+x b. $(1+x)^{-2}$
    c. $-(1+x)^{-1}$ d. $-(1+x)^{-2}$

17. Suppose f(x) is differentiable at x=1 and $\lim_{h\to0} \frac{f(1+h)}{h} = 5$ then f'(1) equals
    a. 3 b. 4
    c. 5 d. 6

18. The order of the differential equation of family of curves represented by an equation containing four arbitrary constants, will be
    a. 2 b. 4
    c. 5 d. 6

19. A bag contains 4 white, 5 black and 6 red balls. If a ball is drawn at random, then what is the probability that the drawn ball is either white or red
    a. 1/2 b. 2/3
    c. 2/5 d. 4/15

20. If mean = (3 median - mode) k, then the value of k is
    a. 1 b. 2
    c. 1/2 d. 3/2

21. Select the pair whose dimensions are same
    a. Pressure and Stress
    b. Stress and Strain
    c. Pressure and Force

d. Power and Force

22. A particle moves in a plane with constant acceleration in a direction different from the initial velocity. The path of the particle will be
a. st. line b. arc of circle
c. parabola d. ellipse

23. It is not possible to write directly on blotting paper or newspaper with ink pen
a. viscosity b. inertia
c. friction d. capilarity

24. w_w is weight of 5 liter of benzene in winter and w_s is that in summer. Then,
a. $w_w > w_s$ b. $w_w < w_s$
c. $w_w = w_s$ d. None

25. The amount of radiation emitted by a perfectly black body is proportional to
a. T b. T^2
c. T^3 d. T^4

26. When a plane mirror is rotated through an angle θ then the reflected ray turns through the angle 2θ then the size of the image
a. is doubled b. is halved
c. remains same d. becomes ∞

27. A thin convex lens of focal length 10 cm is placed in contact with a concave lens of same material and of same focal length. The focal length of combination will be
a. 0 b. 10 cm
c. 20 cm d. ∞

28. By Huygen's wave theory of light, we cannot explain the phenomenon of
a. Interference b. Diffraction
c. Photoelectric effect d. Polarisation

29. The velocity of light emitted by a source S observed by an observer O, who is at rest with respect to S is c. If the observer moves towards S with velocity v, the velocity of light as observed will be
a. c+v b. c-v
c. c d. $\sqrt{c^2 - v^2}$

30. 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. -Q/2 b. -Q/4
c. Q/2 d. Q/4

31. The example for non-ohmic resistance is
a. copper wire b. diode
c. carbon resistance d. tungsten wire

32. In electromagnetic induction, the induced charge in a coil is independent of
a. change in flux b. time
c. resistance d. none

33. The rest mass of the photon is
a. 0 b. ∞
c. between 0 and ∞ d. 10^7 m/s

34. A photon, an electron and a uranium nucleus all have the same wavelength. The one with the most energy
a. photon b. electron
c. uranium nucleus d. equal energy

35. In the depletion region of an unbiased P-N junction diode there are
a. only electrons b. only holes
c. both electrons and holes d. only fixed ion

36. What is the modulation index of an over modulated wave
a. 0 b. 1
c. <1 d. >1

37. In a reaction the rate of reaction is proportional to its active mass, this statement is known as
a. Law of mass action
b. Le-Chatlier's principle
c. Faraday law of electrolysis
d. Law of constant proportion

38. Rutherford's experiment on scattering of particles showed for the first time that the atom has
a. electrons b. protons
c. nucleus d. neutrons

39. The oxidation number of Cl in HOCl
a. +1 b. –1
c. 0 d. + 2

40. Ionization potential is lowest for
a. Halogens b. Inert Gases
c. Alkaline earth metals d. Alkali metal

41. The minimum energy a molecule should possess in order to enter into a fruitful collision is known as
a. Reaction energy
b. collision energy
c. activation energy
d. threshold energy

42. The process, in which no heat enters or leaves the system, is termed as
a. isochoric b. isobaric
c. isothermal d. adiabatic

43. Among the following, identify the compound which cannot act as both oxidising and reducing agents
a. H_2O_2 b. SO_2
c. H_2 d. Cl_2

44. Nitrogen reacts with metal to give

a. nitrate b. nitride
c. nitrite d. doesn't react

45. Which of the following are formed by Xenon
a. XeF_3 b. XeF_4
c. XeF_5 d. XeF_6

46. Potash alum is a
a. complex salt b. acid salt
c. double salt d. normal salt

47. What are the metal ion are present in carnalite?
a. Mg^{2+}, K^+ b. Al^{3+}, Na^+
c. Na^+, Mg^{2+} d. Zn^{2+}, Mg^{2+}

48. Calamine is
a. ZnS b. $ZnCO_3$
c. $ZnSO_4$ d. ZnO

49. Metal which can be extracted from all the three dolomite, magnesite and carnallite is
a. Na b. K
c. Mg d. Ca

50. IUPAC name of acetyl salicylic acid is
a. m-benzoic acid
b. 2-acetoxy benzoic acid
c. p-benzoic acid
d. p-acetyl benzoic acid

51. The number of σ and π bonds in a molecule of benzene is
a. 6σ and 9π b. 9σ and 3π
c. 12σ and 3π d. 6σ and 6π

52. Which of the following compound is expected to be most basic
a. aniline b. methylamine
c. hydroxylamine d. ethylamine

53. The phonemic transcription of word "Jacket" is
a. /ˈdʒækt/ b. /ˈdʒækɪt/
c. /ˈdʒæk:t/ d. /ˈdʒæ:kɪt/

54. In the word "active" the stress falls on the ……. syllable.
a. 1st b. 2nd
c. 3rd d. 4th

55. He phoned her after she ……her office.
a. had left b. left
c. leave d. have left

56. I went home _____ Dashain.
a. at b. in
c. during d. on

57. What is the passive of 'I did it.'?
a. It is done.
b. It is being done.
c. It was done.
d. It has been done.

58. a sentimental longing or wishful affection for a period in the past:
a. melancholy b. nostalgia
c. serenity d. tranquility

59. He is leaving country <u>for a good</u>. The underlined word means
a. for a better opportunity
b. for a good cause
c. forever
d. for other's good

60. Synonym of "canny" is
a. obstinate b. handsome
c. clever d. stout

SECTION -II

Select the best alternatives: [40 x2 =80]

Read the passage carefully and put the correct answer on the answer sheet given (61-63):

I believe that only one person in a thousand knows the trick of really living in the present. Most of us spend 59 minutes an hour living in the past, with regret for lost joys, or shame for things badly done both utterly useless and weakening. – or in a future which we either long for or dread. Yet the past is gone beyond repair, and every minute you spend in the vain effort to anticipate the future is a moment lost. There is only one world, the world pressing against you at this minute. There is only one minute in which you are alive, this miracle – here and now. The only way to live is by accepting every minute as an unrepeatable miracle. Which is exactly what it is – a miracle and unrepeatable.

Questions:

61. People live either in the past or in the future
a. because they are in the habit of chewing the cud
b. because they are a prey to imaginary fears
c. because they are chained to memory and desire
d. None of these

62. What is an unrepeatable miracle?
a. Every moment that we live and spend
b. To repair the past
c. To crave for what is not
d. None of these

63. The attitude of the author is
a. romantic c. political
b. classical d. pragmatic

64. He said to her, "Don't read so fast."
a. He told her not to read so fast.

b. He advised her don't read so fast.
c. He requested her not to read so fast.
d. He ordered her not to read so fast.

65. She is not only a receptionist but also an accountant. It is ___ sentence:
a. simple b. compound
c. complex d. compound-complex

66. The horse and carriage _____at the door.
a. are b. is
c. have d. has

67. If $\log_a m, \log_b m, \log_c m$ are in HP, then a,b,c are in
a. AP b. GP
c. HP d. AGP

68. Eight points are chosen from a line and five from a line parallel to it. How many triangles can be formed by using these points?
a. 220 b. 80
c. 140 d. 40

69. The angles A,B,C of triangle ABC are in AP and $\frac{b}{c}=\sqrt{\frac{3}{2}}$ then A =
a. 60° b. 45°
c. 75° d. 90°

70. $\left|\frac{(1+i)(2+i)}{(3+i)}\right| =$
a. $\frac{1}{\sqrt{5}}$ b. $\frac{2}{\sqrt{5}}$
c. $\frac{1}{2}$ d. 1

71. If $2^x + 2^y = 2^{x+y}$ then $\frac{dy}{dx}$ at x=y=1 is
a. 1 b. -1
c. 2 d. -2

72. The value of $\int_1^e \log x\, dx =$
a. e b. 1
c. e-1 d. 1-e

73. $\lim_{x \to \infty} \sqrt{x^2+8x+3} - \sqrt{x^2+4x+3}$
a. 0 b. 1
c. 2 d. doesn't exist

74. The area bounded by curve $x^2 = 4ay$ and st. line y = 2a in square units is
a. $\frac{16\sqrt{2}}{3}a^2$ b. $\frac{16}{3}a^2$
c. $\frac{8}{\sqrt{3}}a^2$ d. $\frac{8\sqrt{2}}{3}a^2$

75. If the roots of $px^2 + qx + r = 0$ be in the ratio of 4:5 then
a. $12pr = 25q^2$ b. $25pr = 12q^2$
c. $81q^2 = 20pr$ d. $25pr = 3q^2$

76. $\begin{vmatrix} 1 & 0 & -k \\ 2 & 1 & 3 \\ k & 0 & 1 \end{vmatrix} = 0$ for k =
a. -1 b. 0
c. 1 d. for all k in R

77. The equation of tangent to the parabola $y^2 = 5x$ perpendicular to the line x+2y-7 = 0 is:
a. 16x-8y + 5 = 0 b. 4x-2y+8 = 0
c. 4x-4y + 9 = 0 d. 2x-y+11 = 0

78. If $(\tan^{-1} x)^2 + (\cot^{-1} x)^2 = \frac{5\pi^2}{8}$ then x=
a. -1 b. 0
c. 1 d. 2

79. A variable plane is at a constant distance p from the origin and meets the axes at A, B, C. The locus of the centroid of the triangle ABC is
a. $x^2+y^2+z^2 = p^2$
b. $x^2+y^2+z^2 = 9p^2$
c. $x^{-2}+y^{-2}+z^{-2} = p^{-2}$
d. $x^{-2}+y^{-2}+z^{-2} = 9p^{-2}$

80. In what ratio the XY-plane divides the line segment joining points (-1,3,4) & (2,-5,6) is
a. 2:3 internally
b. 2:3 externally
c. 3:2 internally
d. 3:2 externally

81. If the position vectors A and B are $3\mathbf{i}-2\mathbf{j}+\mathbf{k}$ and $2\mathbf{i}+4\mathbf{j}-3\mathbf{k}$ the $|\mathbf{AB}|$
a. $\sqrt{14}$ b. $\sqrt{29}$
c. $\sqrt{43}$ d. $\sqrt{53}$

82. A body of mass 2kg has an initial velocity of 5m/ s along OA is subjected a force 4N perpendicular to OA. The displacement of the body after 4 seconds will be:
a. 12 m b. 20 m
c. 26 m d. 36 m

83. The distance between two rails is 1 m on a circular track of radius 400 m. The outer rail must be raised be how much distance so that a train moves with a speed of 20 m/s without any friction.
a. 5 cm b. 10 cm
c. 15 cm d. 20 cm

84. A soap bubble is blown to a diameter of 7cm. if 36960 erg work is done to blow it further, then the new radius when the surface tension is 40dyne/cm is:
a. 7 cm b. 15 cm

c. 3.5 cm d. 14 cm

85. A block of metal of specific heat capacity 0.10.1 cal/g∘C fall from a height of 100 m. If 60% of energy of fall is converted into heat then rise in temperature is:
a. 1.43°C b. 1.53°C
c. 1.62°C d. 0.95°C

86. A carnot engine whose source is at 400K, takes 200 calories of heat and rejects 150 calories of heat to sink. The temperature of sink is:
a. 267 K b. 200 K
c. 300 K d. 250 K

87. To make an achromatic combination a convex lens of focal length 42 cm having dispersive power 0.14 I placed in contact with a concave lens of dispersive power 0.21. The length of the convex lens should be
a. 14 cm b. 21 cm
c. 63 cm d. 42 cm

88. A capacitor has capacitance C in air. The either half part of the plate is filled with a dielectric of constant K. The new capacitance will be:
a. KC b. (K+1)C
c. $\frac{K+1}{2C}$ d. (K-1)C

89. A current in the windings on a toroid is 2A. There are 400 turns and the mean circumferential length is 40cm. If the magnetic field inside is 1T, the relative permeability is :
a. 200 b. 250
c. 400 d. 150

90. An ammeter reads up to 1 A. Its internal resistance is 0.81 Ω. To increase the range to 10 A, the value of shunt required is:
a. 0.9 Ω b. 0.09 Ω
c. 0.03 Ω d. 0.3 Ω

91. A cord attached to a vibrating tuning fork is divided into six string segments under a tension of 36 N. it will be divided into 4 segments if the tension is
a. 16 N b. 24 N
c. 48 N d. 81 N

92. If the electron in hydrogen atom jumps from third orbit to second orbit, the wavelength of the emitted radiation is given by:
a. 36/5R b. 5R/36
c. 5/R d. R/6

93. The count rate of a radioactive source at t=0 was 1600 count/sec and at t= 8 sec it was 100 count/sec. The count rate at t = 6 sec will be
a. 150 b. 200
c. 300 d. 400

94. A current 2 A when passed for 5 hours through a molten metal salt, deposits 22.2 g of metal of atomic weight 177. The oxidation state of the metal in the metal salt is
a. +1 b. +2
c. +3 d. +4

95. 6.3gm of hydrated oxalic acid ($H_2C_2O_4 \cdot H_2O$) is present in 100 ml normal solution of the acid. The mole of water of crystallization is
a. 2 b. 3
c. 4 d. 5

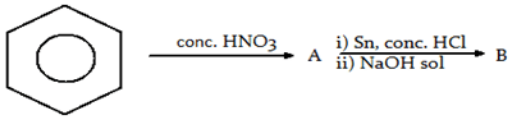
96. A container of volume V contains 0.28 g of N2 gas, if some amount of an unknown gas under similar condition of temperature and pressure weight 0.44 g, the molecular mass of the gas is
a. 22 b. 44
c. 66 d. 88

97. Identify the incorrect statement with respect to ozone
a. Ozone is formed in the upper atmosphere by a photochemical reaction involving dioxygen
b. Ozone is more reactive than oxygen
c. Ozone is diamagnetic whereas dioxygen is paramagnetic
d. Ozone protects the earth's inhabitants by absorbing γ radiations

98. The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarizing power of the cationic species, K^+, Ca^{2+}, Mg^{2+}, Be^{2+}?
a. $Ca^{2+} < Mg^{2+} < Be^{2+} < K^+$
b. $Mg^{2+} < Be^{2+} < K^+ < Ca^{2+}$
c. $Be^{2+} < K^+ < Ca^{2+} < Mg^{2+}$
d. $K^+ < Ca^{2+} < Mg^{2+} < Be^{2+}$

99. An organic compound A reacts with sodium metal and forms B. On heating with conc. H_2SO_4, A gives diethyl ether. What are A and B?
a. C_4H_9OH and C_4H_9ONa
b. CH_3OH and CH_3ONa
c. C_2H_5OH and C_2H_5ONa
d. C_3H_7OH and CH_3ONa

100. What are A and B in the given sequence, respectively?



a. Aldehyde, nitro compound
b. Nitro compound, phenyl amine
c. Phenyl amine, nitro compound
d. Phenthalene, phenyl amine