# 71/2014

Maximum : 100 marks

Time : 1 hour and 15 minutes

1. Who helped Motilal Nehru to prepare the " Nehru's Constitution" in 1928?
   (A) Lala Lajpath Rai (B) Tejbahadur Sapru
   (C) Subash Chandra Bose (D) Jawaharlal Nehru

2. Name the famous Indian political leader who was born at Panniyankara in Kozhikkode in 1896 :
   (A) VK Krishnamenon (B) Chettur Sankaran Nair
   (C) Pattabi Sitharamayyar (D) VR Krishnayyar

3. Who is popularly Known as " Lion of Bengal" ?
   (A) Balagangadhara Tilak (B) Lala Lajpath Rai
   (C) Aurobindo Ghosh (D) Surendranath Bannerjee

4. The First Malayalam newspaper Rajyasamacharam was published in the year :
   (A) 1487 (B) 1687
   (C) 1847 (D) 1867

5. Who banned the Slave trade of Thiruvithamcore?
   (A) Chithira Thirunal Balaramavarma (B) Sreemoolam Thirunal
   (C) Rani Lakshmibai (D) None of the above

6. Sidhu and Kanhu were associated with the :
   (A) Santhal revolt (B) Faqir revolt
   (C) Sanyasi revolt (D) Poligar revolt

7. Indravathi is a tributory of which river :
   (A) Krishna (B) Kaveri
   (C) Godavari (D) Tapti

8. The transfer of capital of India from Culcutta to Delhi was announced by :
   (A) Lord Minto (B) Lord Hardinge
   (C) Lord Curzon (D) None of the above

9. In which session George Yule became the president of Indian National Congress :
   (A) Culcutta (B) Madras
   (C) Kanpur (D) Allahabad

10. Constituent Assembly adopted the" Janaganamana" as India's National Anthem on :
    (A) 26 January 1950 (B) 24 January 1950
    (C) 14 August 1947 (D) 15 August 1947

11. Who was the first Indian to offer Individual Sathyagraha in 1940?
    (A) Vinoba Bhave (B) Jawaharlal Nehru
    (C) Sardar Vallabai Patel (D) Acharya Kripalani

12. The "Bharata Matha Association" was founded in Madras by :
    (A) Lal Hardayal and Ajith Singh
    (B) Nilakanda Brahmachari and Vanchi Aiyer
    (C) Barindrakumar Ghosh and Jatindranath Bannerjee
    (D) Sachindra Sanyal and Sufi Ambu Prasad

13. How many delegates attended the 3rd session of the Indian national Congress in Madras?
    (A) 72 (B) 434
    (C) 607 (D) 1248

14. The following person not related with the famous Dandi March :
    (A) Krishnan Nair (B) Raghavapoduval
    (C) Sankarjee (D) None of the above

15. Who was elected as the speaker of the Central Legislative Assembly by Swarajist in 1925?
    (A) Vithalbai Patel (B) Vallabai Patel
    (C) C.R. Das (D) Mothilal Nehru

16. Marc Bloch and Lucien Febvre founded the:
    (A) Marxist School (B) Subaltern School
    (C) Post Modernist School (D) Annales School

17. The place where Mangal Panday revolted against company's rule :
    (A) Bharackpore (B) Sholapur
    (C) Meerut (D) Vellore

18. Name the person associated with this quotations :
    "At the Stroke of midnight hour, Where the world sleeps, India will awake to life and freedom"
    (A) Mahatma Gandhi (B) Muhammed Ali Jinnah
    (C) Dr. Rajendraprasad (D) Jawaharlal Nehru

19. The British Govt appointed a famine commission in India in 1898 under the chairmanship of :
(A) Sir Richard Strachey
(B) Sir James Lyall
(C) Sir Antony Mac Donnel
(D) Sir John Woodhead

20. "Tuhfat - ul- Muwahidin" is written by :
(A) Devendranath Tagore
(B) Anandamohan Bose
(C) Rajaram Mohan Roy
(D) None of the above

21. The vitamin riboflavin is known as :
(A) Vitamin B1
(B) Vitamin B2
(C) Vitamin B6
(D) Vitamin B12

22. A Water soluble vitamin is :
(A) Vitamin A
(B) Vitamin D
(C) Vitamin C
(D) Vitamin E

23. An example of Isoquinoline Alkaloid :
(A) Piperine
(B) Coniine
(C) Morphine
(D) Quinine

24. Which is an unsaturated fatty acid?
(A) lauric acid
(B) palmitic acid
(C) stearic acid
(D) oleic acid

25. Kiliani-Fischer synthesis is used for :
(A) lengthening of carbon atom chain
(B) conversion of aldoses to ketoses
(C) shortening of carbon atom chain
(D) synthesis of ketoses

26. Pyridine reacts with a mixture of $KNO_3$ and $H_2SO_4$ at 300°C to form :
(A) 1-nitropyridine
(B) 2-nitropyridine
(C) 4-nitropyridine
(D) 3-nitropyridine

27. An amino acid containing sulphur group is :
(A) glycine
(B) alanine
(C) leucine
(D) cysteine

28. Which among the following is the most basic?
(A) Benzylamine
(B) Aniline
(C) Acetanilide
(D) p-nitro aniline

29. Which among the following is a Vat dye?
(A) Methyl Red
(B) Congo red
(C) Indigo
(D) Alizarin

30. Which type of rubber is used for making fuel filling hoses?
(A) Natural rubber (B) Nitrile rubber
(C) Polychloroprene rubber (D) SBR

31. Non stick frying pan is coated with :
(A) PTFE (B) PVC
(C) PMMA (D) PAN

32. Which drug acts both as analgesic and antipyretic?
(A) Aspirin (B) Morphine
(C) Codine (D) Pamaquinine

33. The following pairs $_{14}si^{30}$ $_{15}p^{31}$ are :
(A) isotonic (B) isobars
(C) isotopes (D) none

34. A radioactive isotope has a half life period of 128.6 m its decay constant is :
(A) 1/200 $m^{-1}$ (B) 1/300 $m^{-1}$
(C) 1/100 $m^{-1}$ (D) 1/50 $m^{-1}$

35. The bond order of $O_2^{2-}$ ion is:
(A) 0 (B) 1
(C) 1.5 (D) 2

36. The percentage efficiency of a Carnotes engine working between the temperature 27°C and 127°C :
(A) 25% (B) 2.5%
(C) 50% (D) 5.0%

37. Which type of crystal system is Zinc oxide and graphite?
(A) Cubic (B) Tetragonal
(C) Hexagonal (D) Triclinic

38. The number of atoms in a body centred unit cell :
(A) 4 (B) 2
(C) 1 (D) 4.5

39. The boiling point of 0.25 molal solution of glucose (molar mass 180) in water is 101.3°C the molal elevation constant of water is :
(A) 0.52°C (B) 5.2°C
(C) 0.052°C (D) 1.4°C

40. A 5% solution of urea (molar mass 60) is isotonic with 3% solution of unknown compound A. What is the molecular mass of A?
(A) 36 (B) 3.6
(C) 360 (D) 72

41. 20 dm3 of a gas a (molar mass 64) diffused through a porous partition in 60 seconds. What volume of B (molar mass 32) will diffuse under similar conditions in 60 seconds?
(A) 10 dm3 (B) 1.0 dm3
(C) 100 dm3 (D) 0.1 dm3

42. At what temperature would $SO_2$ molecules have the same root mean square velocity as oxygen molecules at 27 degree centigrade :
(A) 290.5 degree centigrade (B) 327 degree centigrade
(C) 29 degree centigrade (D) 100 degree centigrade

43. What will be the value of $\Delta G$ when the reaction is spontaneous:
(A) $\Delta G = 0$ (B) $\Delta G$ = negative
(C) $\Delta G$ = positive (D) None

44. How many degree of freedom will be present in a solution of sodium sulphate in equilibrium with water vapour?
(A) 2 (B) 4
(C) 3 (D) 0

45. 50% $N_2O_4$ decomposes in 10 minutes find out its velocity coefficient if the reaction is first order :
(A) .0693 $min^{-1}$ (B) 69.3 $m^{-1}$
(C) 0.693 $m^{-1}$ (D) 693 $m^{-1}$

46. A polymer sample contains 5 molecules of molar mass 1000g/mol, 5 molecules of molar mass 2000g/mole and 5 molecules of molar mass 3000g/mol its number average molecular mass is :
(A) 2000g/mol (B) 1000g/mol
(C) 200.0g/mol (D) 4000g/mol

47. The electrochemical equivalent Z of Ag is .001119g calculate its equivalent mass :
(A) 108 (B) 10.8
(C) 1.08 (D) 1080

48. Which of the following has square geometry?
(A) $XeF_4$ (B) $XeOF_4$
(C) $XeO_3$ (D) $XeF_6$

49. Which is the most abundant inert gas?
(A) He (B) Xe
(C) $N_2$ (D) Ar

50. Bordeaux Mixture is a mixture :
(A) $FeSO_4$ + lime (B) $CuSO_4$ + lime
(C) $NiSO_4$ + lime (D) None

51. Which of the following is not a sulphide ore?
(A) Copper glance (B) Argentite
(C) Zinc Blende (D) Calamine

52. Fenton's reagent is :
(A) $FeSO_4 + H_2O_2$ (B) $CuSO_4 + H_2O_2$
(C) $NiSO_4 + H_2O_2$ (D) None

53. Wikinsons's catalyst is :
(A) $(Pph_3)_3$ Rhcl (B) $Ticl_4 + (C_2H_5)_3$ Al
(C) Pt/PtO (D) K [$Ptcl_3$ $C_2$ $H_4$]

54. What is the percentage of Ag in German Silver?
(A) 0% (B) 5%
(C) 20% (D) 10%

55. What is the oxidation state of Cr in chromium peroxide?
(A) 6 (B) 8
(C) 10 (D) 2.5

56. Benzenediazonium chloride reacts with warm water to give :
(A) aniline (B) phenol
(C) benzene (D) chlorobenzene

57. Naphthalene on treatment with concentrated sulphuric acid at 165°c produces :
(A) 1-napthalene sulphonic acid (B) 2-napthalene sulphonic acid
(C) 9-napthalene sulphonic acid (D) no reaction

58. Which of the following is a thermosetting polymer?
(A) melanine formaldehyde resins (B) nylon 6,6
(C) PVC (D) teflon

59. Which of the following is a male sex hormone :
(A) androsterone (B) estrone
(C) progesterone (D) estradiol

60. What type of radiation is used in NMR spectroscopy?
(A) Visible light (B) UV light
(C) Radio Waves (D) Microwave

61. A particle moving with velocity 'V' collides with another particle of the same mass which is at rest. The velocity of centre of mass after the collision is :

(A) $2V$ (B) $V$

(C) $\frac{V}{2}$ (D) $V\sqrt{2}$

62. In case of friction between two bodies :

(A) rolling friction > static friction > kinetic friction

(B) static friction < kinetic friction < rolling friction

(C) kinetic friction> rolling friction> static friction

(D) static friction> kinetic friction> rolling friction

63. Consider the following statements. A particle executing uniform circular motion has :

(1) tangential velocity (2) radial acceleration

(3) tangential acceleration (4) radial velocity

Of these statements

(A) 1 and 2 are correct (B) 1 and 3 are correct

(C) 2 and 4 are correct (D) 3 and 4 are correct

64. The escape velocity on the surface of the earth is $V_0$. If M and R are the mass and radius of the earth respectively, then the escape velocity on another planet of mass 2M and radius R/2 will be :

(A) $4V_0$ (B) $2V_0$

(C) $V_0$ (D) $\frac{V_0}{2}$

65. The Lagrange's equations can be written as :

(A) $\frac{\partial L}{\partial \dot{q}_j} = \frac{\partial L}{\partial q_j}$ (B) $\frac{\partial L}{\partial \dot{q}_j} + \frac{\partial L}{\partial q_j} = 0$

(C) $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_j}\right) - \frac{\partial L}{\partial q_j} = 0$ (D) $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_j}\right) + \frac{\partial L}{\partial t} = 0$

66. The value of wavelength for a beam of 150 volt-electron is :

(A) 0.5 Å (B) 1.0 Å

(C) 1.5 Å (D) 15.0 Å

67. The thermonuclear fusion of hydrogen inside the stars is taking place by a cycle of operations. The particular element which acts as a catalyst, is :

(A) nitrogen (B) oxygen

(C) carbon (D) helium

68. The radius of the first orbit of hydrogen atom is $5.29 \times 10^{-11}$ m. The radius of the second orbit of the hydrogen atom is :

(A) $1.32 \times 10^{-11}$ m
(B) $10.58 \times 10^{-11}$ m
(C) $15.87 \times 10^{-11}$ m
(D) $21.16 \times 10^{-11}$ m

69. Which one of the following statements regarding photo-emission of electrons is correct?

(A) Photoelectric emission is instantaneous with the incidence of light
(B) Kinetic energy of electrons increases with the intensity of incident light
(C) Electrons are emitted when the wavelength of the incident light is above a certain threshold
(D) Photoelectrons are emitted whenever a gas is irradiated with ultraviolet light

70. A particle is moving in the one-dimensional square well potential $V(x) = 0$, $|x| < L$, $V(x) = \infty$, $|x| > L$. Its energy eigen values are :

(A) $E_n = \frac{\hbar^2}{2m}\left(\frac{n\pi}{2L}\right)^2$
(B) $E_n = \frac{n^2h^2}{8mL^2}$
(C) $E_n = \frac{n^2\hbar^2}{8mL^2}$
(D) $E_n = \frac{h^2}{8\pi^2}\left(\frac{n\pi}{2L}\right)^2$

71. Bose-Einstein statistics is applicable to systems of :

(A) half integral spin
(B) electrons only
(C) protons only
(D) integral spin

72. From a black body heated to 1000K the maximum intensity of emitted radiation is marked at wavelength $\lambda$. If the temperature is increased to 3000K, the intensity will be shifted to wavelength given by $a\lambda$ where $a$ is :

(A) 3
(B) $\frac{1}{3}$
(C) 9
(D) $\frac{1}{9}$

73. The temperature of a gas is held constant while its volume is decreased. The pressure exerted by the gas on the walls of the container increases because its molecules :

(A) strike the walls with higher velocities
(B) strike the walls with larger force
(C) are in contact with the walls for a shorter time
(D) strike the walls more frequently

74. Diamagnetism is explained in terms of :
(A) Orbital motion of the electron
(B) Spin motion of the electron
(C) Both orbital and spin motion of the electron
(D) Orbital and spin motion of nucleus

75. On a temperature(T) , entropy (S) diagram, the isothermals are :
(A) parallel to S axis
(B) parallel to T axis
(C) may have any orientation
(D) none of the above

76. After losing a number of alpha particles and beta particles (electrons) $U_{92}^{238}$ is changed to $X_{82}^{206}$. The total no. of particles produced in this process is :
(A) 5
(B) 8
(C) 16
(D) 14

77. The minimum energy of the gamma ray photon required for the production of an electron positron pair is :
(A) 4.44 MeV
(B) 2.22 MeV
(C) 1.11 MeV
(D) 3.33 MeV

78. The mass of a proton is $m_p$. Then the nuclear magnetron is given by :
(A) $\frac{h}{4\pi m_p}$
(B) $\frac{eh}{4\pi m_p}$
(C) $\frac{ehm_p}{4\pi}$
(D) $\frac{4\pi m_p}{e\,h}$

79. Rutherford's experiment on the atom demonstrated :
(A) the approximate size of a nucleus
(B) the presence of neutrons inside an atom
(C) the approximate size of an atom
(D) the revolving of electrons in atomic orbits

80. For a neutron the spin magnetic moment is :
(A) zero, as it is chargeless
(B) in the same direction as spin
(C) perpendicular to the direction of spin
(D) opposite in direction to the spin

81. In Young's experiment, the phase difference between two waves at a point where destructive interference takes place is :
(A) 0
(B) $\frac{\pi}{4}$
(C) $\frac{\pi}{2}$
(D) $\pi$

82. Mirage is a phenomena due to :

(A) reflection of light
(B) interference of light
(C) total internal reflection of light
(D) diffraction of light

83. A small object lies on the axis of a cylindrically symmetric optical system. The image will suffer from :

(A) spherical aberration, coma and astigmatism
(B) spherical aberration and coma
(C) spherical aberration and astigmatism
(D) spherical aberration

84. Two thin lenses have a combined power of +10 dioptres. When separated by 20 cm, their equivalent power is +6.25 dioptres. Their individual powers, in dioptres, are:

(A) 7.5 and 2.5
(B) 3.5 and 6.5
(C) 5.0 and 5.0
(D) 9.0 and 1.0

85. Two photons recede from each other. Their relative velocity will be :

(A) 0
(B) $c$
(C) $\frac{c}{2}$
(D) $2c$

86. In the Fourier series $f(x) = f(0) + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$ the value of $a_n$ is given by :

(A) $a_n = \int_{-\pi}^{\pi} f(x) \cos nx \, dx$
(B) $a_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos nx \, dx$
(C) $a_n = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(x) \sin nx \, dx$
(D) $a_n = \frac{1}{\sqrt{2\pi}} \int_{-\pi}^{\pi} f(x) \sin nx \, dx$

87. In a half adder, the Boolean equations for the outputs are :

(A) SUM = A+B, CARRY=A $\oplus$ B
(B) SUM = A $\oplus$ B, CARRY=AB
(C) SUM=A+B, CARRY=B
(D) SUM= A – B, CARRY= A $\oplus$ B

88. Which of the following are true in case of negative feedback amplifiers?

(1) Stability of the amplifier increases
(2) Distortion of the amplifier decreases
(3) Noise in the amplifier decreases
(4) Band-width of the amplifier decreases.

Select the correct answer using the codes given below

Codes :

(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 1, 3 and 4
(D) 2, 3 and 4

89. The flip-flop which gives unpredictable output when both inputs are high is :

(A) JK flip-flop (B) D flip-flop
(C) RS flip-flop (D) T flip-flop

90. In normal Zeeman effect, the frequency separation of the Zeeman lines form the centre line is :

(A) $\frac{eB}{2m}$ (B) $\frac{eB}{2\pi m}$
(C) $\frac{eB}{4m}$ (D) $\frac{eB}{4\pi m}$

91. A total capacitance of 4 $\mu$F can be obtained by combining four capacitors of 3 $\mu$F each. If:

(A) all the capacitors are in parallel
(B) all the capacitors are in series
(C) three capacitors are in series and one capacitor is in parallel to that of the combination
(D) one capacitor is in series with the combination of three capacitors in parallel

92. An LCR circuit contains a varying e.m.f $e = e_m \cos \omega t$. At resonance, the amplitude of the oscillating current is fully determined in terms of $e_m$ and :

(A) R (B) L and C
(C) L and R (D) C and R

93. A wire carrying a 30 A current has a length of 12 cm between the pole pieces of a magnet at an angle of 60° with respect to the field direction. If the magnetic field has a uniform value of 0.90 T, then the force on the wire will be :

(A) 280 N (B) 28 N
(C) 2.8 N (D) 0.28 N

94. A horizontal overhead power line carries a current of 100A directed from West to East. The magnetic field due to the current 2m below the line is :

(A) $1.00 \times 10^{-5}$ T towards South (B) $1.00 \times 10^{-5}$ T towards North
(C) $3.14 \times 10^{-6}$ T towards South (D) $3.14 \times 10^{-5}$ T towards North

95. At a point on the axis of an electric dipole, :

(A) the electric field is zero
(B) the electric potential is zero
(C) neither the electric field nor the electric potential is zero
(D) the electric field is directed perpendicular to the axis

96. The Bragg condition for reflection from a crystal (d = Spacing of the lattice planes, $\theta$ = Angle which the incident neutron beam makes with the planes) is :

(A) $n\lambda = 2d\sin\theta$ (B) $\lambda = 2nd\sin\theta$

(C) $d = \lambda\sin\theta$ (D) $d = n\lambda\sin\theta$

97. The terminal velocity of a spherical ball of radius $2r$ falling under gravity in a viscous fluid is V. The terminal velocity of another spherical ball of the same material but of radius $r$ will be :

(A) $\frac{V}{8}$ (B) $\frac{V}{4}$

(C) $\frac{V}{2}$ (D) $\frac{V}{\sqrt{2}}$

98. A capillary tube of length less than the "capillary height" for a given liquid is dipped in that liquid. Then the liquid will :

(A) overflow

(B) rise to the top and bulge out

(C) rise to the top and the curvature of the meniscus will decrease

(D) not rise to the top

99. One end of a string is connected to an electrically maintained vibrating bar while the other end is made to pass over a frictionless pulley. The free end is then loaded so that the string is under tension $T_1$. The string vibrates in $x_1$ segments as the bar vibrates in transverse mode. If the tension is changed to $T_2$, the string vibrates in $x_2$ segments. Then :

(A) $x_1\sqrt{T_1} = x_2\sqrt{T_2}$ (B) $x_2\sqrt{T_1} = x_1\sqrt{T_2}$

(C) $T_1\sqrt{x_1} = T_2\sqrt{x_2}$ (D) $T_1\sqrt{x_2} = T_2\sqrt{x_1}$

100. Consider the following statements. Ultrasonic waves can be produced by a :

(1) magnetron oscillator

(2) magnetostriction oscillator

(3) klystron oscillator

(4) piezoelectric oscillator

Of these statements

(A) 1 and 4 are correct (B) 2 and 3 are correct

(C) 1 and 3 are correct (D) 2 and 4 are correct