## 161/2023-M

Maximum : 100 marks
Time : 1 hour and 30 minutes

1. Which among the following statement is not true?
(A) Lord Curzon ordered to partition Bengal on July 20, 1905
(B) Partition of Bengal Came into force on October 16, 1905
(C) Bengal was partitioned in order to disrupt the unity between Hindus and Muslims
(D) All are true
2. Consider the following statements and find out which among them are correct?
3. 2023 Lokmanya Tilak National Award was given to Narendra Modi.
4. It was given on August 1 of every year.
5. August 1 is the death anniversary of Lokmanya Tilak.
6. Narendra Modi is the $41^{\text {st }}$ recipient of this Award.
(A) 1 and 2 are correct
(B) 1,2 and 3 are correct
(C) 2,3 and 4 are correct
(D) All are correct
7. 2023 G 20 Empower summit was held in :
(A) Gandhinagar
(B) Bhubaneswar
(C) Chennai
(D) New Delhi
8. Which among the following is not true?
(A) Jupiter 3 is world's largest private satellite
(B) Jupiter 3 was launched in the month of August 2023
(C) It was launched in Florida, USA
(D) It was launched by Elon Musk exploration company spacex
9. Which among the following statements is not true?
(A) Simon Commission was an Indian Statutory Commission
(B) Simon Commission was created in November 1927
(C) Indians protested against the commission because all the members of the commission were Europeans
(D) The protest against the commission resulted in a lathicharge leading to the death of Bipin Chandra Pal

A
6. Which among the following are true in connection with Civil Disobedience Movement?

1. Civil Disobedience Movement was started with Dandi March.
2. Dandi March was started on March 12, 1930.
3. The March was started with 78 followers of Gandhiji.
4. Gandhiji broke salt law on April 6, 1930.
(A) 1 and 2 are true
(B) 2 and 3 are true
(C) 1 and 4 are true
(D) All are true
5. Which among the following statement is true with regard to the Government of India Act 1935?
(A) The Act was passed during the time of Lord Linlithgow
(B) The Act introduced dyarchy in the provinces
(C) The Act provided separate autonomy to the provinces
(D) The Act was repealed in 1936
6. Vaikunta Swamikal Founded Samatva Samajam in the year :
(A) 1835
(B) 1836
(C) 1837
(D) 1840
7. Consider the following statements with regard to the removal untouchability in Kerala. Find out which is incorrect :
(A) C. Krishnan Championed against untouchability through Desabhimani
(B) T.K. Madhavan was a dynamic leader who stood against untouchability
(C) Mannath Padmanabhan organised Savarna Jatha against the practice of untouchability
(D) K. Kelappan led vaikam satyagraha against untouchability
8. Which among the following statements are true?
9. Kerala State gets rainfall both from South-West and North-East Monsoons.
10. South-West Monsoons starts towards the end of May and fades out by about September.
11. South-West Monsoon was discovered by Hippalus, the Egyptian Pilot in 45 A.D.
(A) Only 1 is true
(B) Only 2 is true
(C) Only 3 is true
(D) All are true
12. Regular exercise and controlled diet are conducive ___ good health.
(A) for
(B) with
(C) in
(D) to
13. Either the captain or his crew responsible for the mishap.
(A) is
(B) am
(C) are
(D) was
14. Choose the correct question tag:

I am on the right track,
(A) aren't I?
(B) amn't I?
(C) am I?
(D) None of these
14. The criminal was supposed to be European, wearing yellow T-shirt.
(A) an, a
(B) a , an
(C) an, an
(D) $\mathrm{a}, \mathrm{a}$
15. When the opposition leader arrived, the meeting
(A) started
(B) had started
(C) has started
(D) will start
16. Which of these is a Portmanteau word?
(A) electrocute
(B) brush
(C) grasshopper
(D) post office
17. It is better to $\qquad$ a good dictionary to find the exact meaning of the word.
(A) look at
(B) look for
(C) look on
(D) look up
18. The antonym of naive :
(A) sophisticated
(B) proud
(C) simple
(D) guilty
19. The out of syllabus questions put the students
(A) at bay
(B) at bottom
(C) at sea
(D) at hand

A
20. Our former Prime Minister, P.V. Narasimha Rao, was a person who could speak many languages. (give one-word substitute for the underlined words):
(A) lexicographer
(B) polyglot
(C) linguist
(D) glutton
21. By adding soap in water, its surface tension :
(A) Increases
(B) Decreases
(C) Remains the same
(D) Becomes infinite
22. The excess pressure inside a soap bubble of radius ' $r$ ' having surface tension ' $S$ ' is :
(A) $\frac{2 S}{r}$
(B) $\frac{S}{r}$
(C) $\frac{4 S}{r}$
(D) $\frac{3 S}{r}$
23. The principle based on which Venturimeter works is:
(A) Bernoulli's principle
(B) Pascal's principle
(C) Newton's principle
(D) Stoke's principle
24. The ratio of radii of two wires of same material is $3: 1$. If these wires are stretched by equal force, then, what is the ratio of stresses produced in them?
(A) $9: 1$
(B) $4: 1$
(C) $1: 9$
(D) $1: 4$
25. The thermodynamic process in which no heat enters or leaves the thermodynamic system is named as $\qquad$ process.
(A) Isochoric
(B) Isothermal
(C) Isobaric
(D) Adiabatic
26. The efficiency (in percentage) of a Carnot's heat engine working between sink at 300 K and source at 400 K is :
(A) 25
(B) 75
(C) 50
(D) 80
27. Under steady state condition, temperature of a body
(A) Increases with time
(B) Decreases with time
(C) Does not change with time and is same at all points of the body
(D) Does not change with time and can be different at different points of the body
28. Two coherent sources have amplitudes in the ratio $3: 1$ interfer each other. Then the ratio of the maximum to minimum intensity on a screen is :
(A) $3: 1$
(B) $4: 1$
(C) $9: 1$
(D) $1: 3$
29. The process of achieving population inversion in a LASER system is known as
(A) Stimulation
(B) Absorption
(C) Inversion
(D) Pumping
30. When Newton's rings are observed by a monochromatic light in reflected mode, the central ring appears :
(A) Dark
(B) White
(C) Bright
(D) Yellow
31. Which among the following is an example of a crystalline material?
(A) Glass
(B) Plastic
(C) Rubber
(D) Salt
32. Which spectral series of hydrogen atom lies in the visible region of the electromagnetic spectrum?
(A) Lymann Series
(B) Balmer Series
(C) Brackett Series
(D) Pfund Series
33. Which among the following nucleus has the highest value of binding energy per nucleon?
(A) Iron
(B) Copper
(C) Tin
(D) Zinc
34. What is the value of the Lande's g factor associated with the atomic state symbol ${ }^{3} P_{1}$ ?
(A) $\frac{1}{3}$
(B) $\frac{2}{3}$
(C) $\frac{3}{2}$
(D) $\frac{3}{1}$

A
35. The solubility products of AgCl and $\mathrm{PbCl}_{2}$ are $1.8 \times 10^{-10}$ and $1.7 \times 10^{-5}$ respectively at room temperature. Hydrochloric acid is added to a solution that contains $\mathrm{Ag}^{+}$and $\mathrm{Pb}^{2+}$ until the equilibrium concentration of $\mathrm{Cl}^{-}$becomes 0.10 M . What will be the concentrations of $\mathrm{Pb}^{2+}$ at equilibrium?
(A) $1.7 \times 10^{-5} \mathrm{M}$
(B) $1.7 \times 10^{-4} \mathrm{M}$
(C) $1.7 \times 10^{-3} \mathrm{M}$
(D) $1.8 \times 10^{-10} \mathrm{M}$
36. Which of the following statements are INCORRECT?
(i) A solution of EDTA can be standardized using $\mathrm{CaCO}_{3}$.
(ii) EDTA combines with metal ions in a 1:1 ratio regardless of the charge on the cation.
(iii) Generally, the indicators used in EDTA titrations are organic dyes that form colored chelates with metal ions.
(iv) In the determination of hardness of water, often, a small concentration of magnesiumEDTA chelate is incorporated in the buffer or in the titrant.
(A) (i) and (ii)
(B) (i) and (iv)
(C) (iii) and (iv)
(D) None
37. Which of the following statement(s) is/are related to Heisenberg's Uncertainity Principle?
(i) The concept of orbitals for electrons instead of orbits.
(ii) Broadening of molecular spectra.
(iii) It is related to the wave-particle duality of particles.
(iv) It affects the precision in measuring the energy levels of molecules.
(A) (i) alone
(B) (i) and (iv)
(C) (ii), (iii) and (iv)
(D) All of these
38. Among the following compounds, which one exhibits all three types of chemical bonds : ionic, covalent and coordinate bonds?
(A) $\mathrm{NH}_{4} \mathrm{Cl}$
(B) $\quad \mathrm{KCl} \cdot \mathrm{MgCl}_{2}$
(C) Hydrochloric acid
(D) $\mathrm{Fe}(\mathrm{OH})_{3}$
39. Unpolluted rainwater is:
(A) Neutral
(B) Slightly acidic
(C) Slightly basic
(D) Slightly acidic or basic depending on the season
40. In the conversion of phenol to o-hydroxybenzaldehyde using chloroform and alkali, the principal reactive intermediate formed is :
(A) Carbon free radical
(B) Dichlorocarbene
(C) Phenoxide carbocation
(D) $\mathrm{CCl}_{3}$ carbanion
41. The IUPAC name of the compound with the following structure is :

(A) 3-methyl-3-buten-1-yne
(B) 2-methyl-4-buten-1-yne
(C) 2-methyl-1-buten-3-yne
(D) 3-methyl-1-butyne-3-ene
42. The octane number of a fuel is determined by comparing the fuel to a mixture of :
(A) Iso-octane and n-heptane
(B) Iso-octane and n-octane
(C) n -octane and the fuel
(D) Iso-octane and the fuel
43. What is the product of the ring-opening reaction of an epoxide on acid catalysed hydrolysis?
(A) An aldehyde and a ketone
(B) A ketone
(C) A glycol
(D) A carboxylic acid
44. In the van der Waals equation of real gases, the parameter " b " represents :
(A) Volume of the molecules
(B) Attraction of the molecules
(C) Average distance between the molecules
(D) Average velocity of the molecules
45. A solution of a dye is exposed to light of a particular wavelength. The absorbance of the solution is measured to be 1.0 . What is the percentage of the incident light that is absorbed by the solution?
(A) $10 \%$
(B) $50 \%$
(C) $90 \%$
(D) $100 \%$

A
46. In the following reaction at equilibrium,
$\mathrm{N}_{2} \mathrm{O}_{4}(\mathrm{~g}) \rightleftharpoons 2 \mathrm{NO}_{2}(\mathrm{~g}) \Delta \mathrm{H}=+58 \mathrm{~kJ}$
which of the following changes will cause the equilibrium to shift to the right?
(A) Lowering of temperature
(B) Pressure is increased by adding $\mathrm{N}_{2}$
(C) Adding a catalyst to the system
(D) Decreasing the pressure of the system
47. Which of the following solutions will have the highest equivalent conductance?
(A) 0.1 M NaCl
(B) $\quad 0.01 \mathrm{M} \mathrm{NaCl}$
(C) 0.001 M NaCl
(D) All of the above will have same equivalence conductance
48. How many proton NMR signals will be obtained for isobutane?
(A) One singlet
(B) One singlet and one quartet
(C) One doublet and one quartet
(D) One doublet and dectet
49. Which one is a WRONG statement about sieve tubes?
(i) They are found in pteridophytes and gymnosperms.
(ii) They consist of vertical cells placed one above the other forming long tubes connected at the end walls by sieve pores.
(iii) Sieve areas do not form sieve plates.
(iv) Sieve areas are not well differentiated.
(A) (i), (ii) and (iii)
(B) (i), (iii) and (iv)
(C) (ii) only
(D) (i) and (ii)
50. Which among the following statements is TRUE?
(i) All algae possess chlorophyll and carotenes.
(ii) A parasitic sporophyte over gametophyte is found in ferns.
(iii) Multicellular branched rhizoids and leafy gametophytes are found in all bryophytes.
(iv) Ulothrix is a filamentous alga with flagellated reproductive stages.
(v) Multiciliate spermatozoids are found in Pteris and Cycas.
(A) (i), (ii) and (iii) correct; (iv) and (v) wrong
(B) (i), (ii) and (iv) correct; (iii) and (v) wrong
(C) (i), (iii) and (v) correct; (ii) and (iv) wrong
(D) (i), (iv) and (v) correct; (ii) and (iii) wrong
51. Match the following and choose the CORRECT answer :
(a) Catkin
(i) Achyranthes
(b) Spadix
(ii) Colocasia
(c) Spike
(iii) Coriandum
(d) Umbel
(iv) Ficus
(v) Morus
(a)
(b)
(c) (d)
(A) (i) (iii) (iv) (v)
(B) (ii) (v) (iii) (i)
(C) (iv)
(iii) (ii) (i)
(D) (v)
(ii)
(i) (iii)
52. Choose the CORRECT match from the following :

Berry: —, Cypsella: ——, Regma: —, Syconium:

| (A) Tomato, | Ricinus, | Mimosa, | Piper |  |
| :--- | :--- | :--- | :--- | :--- |
| (B) Guava, | Sun flower, | Ricinus, | Ficus |  |
| (C) | Piper, | Eupatorium, | Mimosa, | Pine apple |
| (D) Mango, | Capsicum, | Banana, | Avocado |  |

53. Choose the CORRECT answer :
(i) Companion cells are nucleated cells of phloem.
(ii) Vessels contain only living cells.
(iii) Sieve cells are enucleated at maturity.
(iv) Abnormal secondary growth due to accessory cambia is found in Asparagus.
(A) True, False, True, True
(B) True, False, True, False
(C) False, True, True, True
(D) False, True, False, True
54. Which among the following statement is TRUE?
(i) Water absorbed by the roots reaches the top of a tree by transpiration pull and cohesion of water molecules.
(ii) Conduction of sap in old plants when heart wood decayed occurs through phloem.
(iii) Warburg effect is associated with bidirectional transport of xylem sap.
(iv) Parthenocarpic fruits are produced by spraying auxins on flowers.
(A) (i) and (ii)
(B) (i) and (iv)
(C) (ii) and (iii)
(D) (ii) and (iv)
55. is the hydrogen transporter in the photosynthetic electron transport system.
(A) Cytochrome f
(B) Pheophytin
(C) Plastocyanin
(D) Plastoquinone
56. Which one of the following statements is NOT applicable to the experimental set up of Munch's mass flow hypothesis given below. Here chamber A contains concentrated sugar solution and chamber B contains dilute sugar solution.

(A) Turgor pressure gradient is responsible for mass flow from A to B through C
(B) Chamber A rapidly absorbs water and result in high TP
(C) The water from chamber $B$ will diffuse out and can again pass through the chamber A
(D) The flow from A to B through C cannot be prolonged even after maintaining a continuous supply of sugar solution to chamber A
57. Morphologically useful and edible part in pineapple is:
(A) Peduncle, bracts, perianth and pericarp
(B) Pericarp and thalamus
(C) Pericarp and placenta
(D) Exocarp and mesocarp
58. A fibre yielding plant where the source of fibre is the phloem :
(A) Cannabis sativa
(B) Cocos nucifera
(C) Cotton
(D) Bamboo
59. Choose the INCORRECT statement from the following :
(A) The major aerosol pollutant present in the jet plane emission is CFC
(B) Oxides of carbon give rise to photochemical smog and PAN
(C) $\mathrm{CO}, \mathrm{N}_{2} \mathrm{O}$ and $\mathrm{SO}_{3}$ combine with haemoglobin and impede oxygen transport
(D) Oxygen is not released in the burning of coal
60. Bharatpur Bird Sanctuary is also known as
(A) Chilka Sanctuary
(B) Darrah Sanctuary
(C) Keibul Lambao National park
(D) Keoladeo Ghana National park
61. The components of London smog, the most severe air pollution occurred in 1952 were ——, particulates like soot, ammonium sulphate and humidity or water from fog.
(A) CFC
(B) $\mathrm{NO}_{2}$
(C) $\mathrm{SO}_{2}$
(D) PAN
62. Match the following and choose the CORRECT answer :
(a) Raimona
(i) Nuclear fallout
(b) Oxygen tank
(ii) National park
(c) Torrey canon
(iii) Thunder dragon
(d) Sr90
(iv) Oil spillage
(v) Climate change

|  | (a) | (b) | (c) | (d) |
| :--- | :--- | :--- | :--- | :--- |
| (A) | (i) | (iv) | (iii) | (v) |
| (B) | (ii) | (iii) | (iv) | (i) |
| (C) | (iii) | (iv) | (i) | (ii) |
| (D) | (iv) | (iii) | (v) | (i) |

63. Which part of the heart conducting system is responsible for initiating the electrical impulses that stimulate the heart to contract?
(A) Atrioventricular (AV) Node
(B) Sinoatrial (SA) Node
(C) Bundle of His
(D) Purkinje fibers
64. When an electrical impulse reaches the Purkinje fibers, what action do they initiate in the heart?
(A) Contraction of the atria
(B) Relaxation of the ventricles
(C) Contraction of the ventricles
(D) Stimulation of the SA node
65. Which blood cells are formed in the bone marrow from magakaryocytes?
(A) Erythrocytes
(B) Monocytes
(C) Basophils
(D) Platelets
66. What is the primary factor that shifts the oxyhemoglobin dissociation curve to the right?
(A) Decreased $\mathrm{CO}_{2}$ levels
(B) Increased pH (alkalosis)
(C) Decreased temperature
(D) Increased 2, 3-BPG (2, 3 - bisphosphoglycerate)
67. During muscle contraction, which molecule binds to calcium ions to initiate the interaction between actin and myosin?
(A) Troponin
(B) Tropomyosin
(C) Myosin
(D) Titin
68. The neurohypophysis, is composed mainly of glial-like cells called :
(A) Pituicytes
(B) Astrocytes
(C) Microglia
(D) Oligodendrocytes
69. Which structure is responsible for the storage and release of calcium ions in striated muscle cells?
(A) Sarcolemma
(B) Sarcoplasmic reticulum
(C) T-tubules
(D) Myofibrils
70. Mesokaryotic cells is present in :
(A) Bacteria
(B) Prions
(C) Dinoflagellate
(D) Coenorhabditis
71. Cisternae, Tubules and Vesicles are the components of :
(A) Endoplasmic reticulum
(B) Lysosomes
(C) Peroxisomes
(D) Ribosomes
72. The flavoprotein present in the Complex I - of the inner mitochondrial membrane is :
(A) Sccinate Dehydrogenase
(B) Coenzyme Q
(C) Cytochrome C
(D) NADH Dehydrogenase
73. The terminal part of a chromosome beyond secondary constriction is called :
(A) Telomere
(B) Satellite
(C) Nucleolar Organizer
(D) Chromatid
74. A characteristic cytoplasm that contains abundant endoplasmic reticulum arranged in concentric layers and also many Golgi vesicle is the speciality of :
(A) Eisinophils
(B) NKCells
(C) Neutrophils
(D) Plasmacells
75. A type I hypersensitive reaction is induced by certain types of antigens referred to as :
(A) Paratopes
(B) Immunogens
(C) Allergens
(D) Epitopes
76. Which among the following is an example for Autoimmune disease?
(A) Erythroblastosis foetalis
(B) Lukaemia
(C) Insulin-Dependent Diabetes Mellitus (IDDM)
(D) AIDS

A
77. If the matrix $A=\left[\begin{array}{ll}2 & 3 \\ x & y\end{array}\right]$ has eigen values 4 and 8 , then :
(A) $x=4, y=10$
(B) $x=-4, y=-10$
(C) $x=-4, y=10$
(D) $x=4, y=-10$
78. Let $A$ be a square matrix such that $A^{k}=0$. Then inverse of $I-A$ is:
(A) $I$
(B) $I+A$
(C) $I+A^{k-1}$
(D) $I+A+A^{2}+\ldots+A^{k-1}$
79. The value of $\left|\frac{1-w}{w^{2}+w}\right|$ where $w$ is a non-real cube root of 1 .
(A) $\sqrt{3}$
(B) $\sqrt{2}$
(C) 1
(D) $\frac{4}{\sqrt{3}}$
80. The value of $\sqrt{-2+2 \sqrt{3}} i$ is :
(A) $\pm \sqrt{3}+i$
(B) $\pm \sqrt{3}-i$
(C) $\pm(1+i \sqrt{3})$
(D) $\pm(1-i \sqrt{3})$
81. The distance between the foci of an ellipse is 6 units and its minor axis is 8 units. Then the eccentricity is :
(A) $\frac{4}{5}$
(B) $\frac{1}{\sqrt{52}}$
(C) $\frac{3}{5}$
(D) $\frac{1}{2}$
82. If the distance between the points $(3, b)$ and $(8,7)$ is 13 , then $b$ is equal to :
(A) 5 or -19
(B) 5 or 19
(C) -5 or -19
(D) -5 or 19
83. Which of the following is true for the function $f(x)=x^{3}-6 x^{2}+9 x+25$ ?
(A) $f$ has a maxima at $x=1$ and minima at $x=3$
(B) $f$ has a maxima at $x=3$ and minima at $x=1$
(C) $f$ has only minima at $x=1$
(D) $f$ has only maxima at $x=3$
84. $\lim _{x \rightarrow \infty} \frac{2023 x^{2}+2022 x+2021}{x^{2}+2022 x+2020}$ equals :
(A) 2023
(B) 1
(C) $\frac{2021}{2020}$
(D) $\infty$
85. Which of the following equations is an exact differential equation?
(A) $\left(x^{2}+1\right) d x-x y d y=0$
(B) $x d y+(3 x-2 y) d x=0$
(C) $2 x y d x+\left(2+x^{2}\right) d y=0$
(D) $x^{2} y d y-y d x=0$
86. An integrating factor of $x \frac{d y}{d x}+(3 x+1) y=x e^{-2 x}$ is :
(A) $x e^{3 x}$
(B) $3 x e^{x}$
(C) $x e^{x}$
(D) $x^{3} e^{x}$
87. If $\bar{a}, \bar{b}, \bar{c}$ are unit vectors and $\bar{a}+\bar{b}+\bar{c}=\overline{0}$ then $\bar{a} \cdot \bar{b}+\bar{b} \cdot \bar{c}+\bar{c} \cdot \bar{a}$ is :
(A) $\frac{2}{3}$
(B) 0
(C) $\frac{-3}{2}$
(D) 1
88. If $|\bar{a}|=3,|\bar{b}|=4$ and $\bar{a} \cdot \bar{b}=6$, then find the value of $|\bar{a} \times \bar{b}|$ :
(A) $\sqrt{3}$
(B) $4 \sqrt{3}$
(C) $6 \sqrt{3}$
(D) $8 \sqrt{3}$
89. Consider the following statements :

Statement (i) : All cyclic groups are abelian.
Statement (ii) : The order of a cyclic group is same as the order of its generator.
Which of the following is correct?
(A) Both (i) and (ii) are false
(B) (i) is true (ii) is false
(C) (i) is false (ii) is true
(D) Both (i) and (ii) are true
90. Which of the following is not a field?
(A) $\mathbb{Z}_{4}$
(B) $\mathbb{Z}_{5}$
(C) $\mathbb{Z}_{7}$
(D) $\mathbb{Z}_{2}$

A
17

（A）விக๐
（B）கேフロカிリノ

（D）கபேンாை

（A）ஜிவசூவం
（B）
（C）ウృळேைற๐
（D）Bीøృ๐











（A）ভூவMmை

（C）கフロகாృ๐
（D）รวన円ว๓ை๐

（A）๘ัตถ
（B） 1 roco
（C）$ை 5$
（D）๙ロற

（A）வையை＋கక＋உஸி
（B）வைஸை＋கకృఱை

（D）வயைகรூn＋உணி

（A）هயுவேロ๐ழ




（A）صிmையmைறைコロ வைナmg
（B）エ্ூmm








SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

