DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Test Booklet No. :

Series

00217   **A**

TEST BOOKLET

GENERAL STUDIES
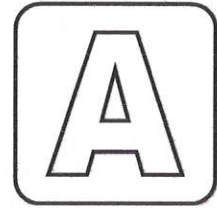
Time Allowed : 2 Hours   **Full Marks : 200**

Read the following instructions carefully before you begin to answer the questions :

1. The name of the Subject, Roll Number as mentioned in the Admission Certificate, Test Booklet No. and Series are to be written legibly and correctly in the space provided on the Answer-Sheet with Black/Blue ballpoint pen.

2. **Answer-Sheet without marking Series as mentioned above in the space provided for in the Answer-Sheet shall not be evaluated.**

3. All questions carry equal marks.
    The Answer-Sheet should be submitted to the Invigilator.
    Directions for giving the answers : Directions for answering questions have already been issued to the respective candidates in the 'Instructions for marking in the OMR Answer-Sheet' along with the Admit Card and Specimen Copy of the OMR Answer-Sheet.

    Example :
    Suppose the following question is asked :
    The capital of Bangladesh is
    (A) Chennai
    (B) London
    (C) Dhaka
    (D) Dhubri

    You will have four alternatives in the Answer-Sheet for your response corresponding to each question of the Test Booklet as below :

    Ⓐ Ⓑ Ⓒ Ⓓ

    In the above illustration, if your chosen response is alternative (C), i.e., Dhaka, then the same should be marked on the Answer-Sheet by blackening the relevant circle with a Black/Blue ballpoint pen only as below :

    Ⓐ Ⓑ ● Ⓓ

    The example shown above is the only correct method of answering.

4. Use of eraser, blade, chemical whitener fluid to rectify any response is prohibited.

5. Please ensure that the Test Booklet has the required number of pages (20) and 100 questions immediately after opening the Booklet. In case of any discrepancy, please report the same to the Invigilator.

6. No candidate shall be admitted to the Examination Hall/Room 20 minutes after the commencement of the examination.

7. No candidate shall leave the Examination Hall/Room without prior permission of the Supervisor/Invigilator. No candidate shall be permitted to hand over his/her Answer-Sheet and leave the Examination Hall/Room before expiry of the full time allotted for each paper.

8. No Mobile Phone, Electronic Communication Device, etc., are allowed to be carried inside the Examination Hall/Room by the candidates. Any Mobile Phone, Electronic Communication Device, etc., found in possession of the candidate inside the Examination Hall/Room, even if on off mode, shall be liable for confiscation.

9. No candidate shall have in his/her possession inside the Examination Hall/Room any book, notebook or loose paper, except his/her Admission Certificate and other connected papers permitted by the Commission.

10. Complete silence must be observed in the Examination Hall/Room. No candidate shall copy from the paper of any other candidate, or permit his/her own paper to be copied, or give, or attempt to give, or obtain, or attempt to obtain irregular assistance of any kind.

11. This Test Booklet can be carried with you after answering the questions in the prescribed Answer-Sheet.

12. Noncompliance with any of the above instructions will render a candidate liable to penalty as may be deemed fit.

13. No rough work is to be done on the OMR Answer-Sheet. You can do the rough work on the space provided in the Test Booklet.

N.B. : There will be negative marking @ 0·25 per 1 (one) mark against each wrong answer.

/2-A   **[No. of Questions : 100]**

1. Consider the following statements :

   (i) The CAG (Comptroller and Auditor General of India) is appointed by the Prime Minister of India.

   (ii) The CAG holds his office till the pleasure of the President.

   (iii) The term of the office of the CAG is six years from the date on which he assumes office.

   (iv) He is disqualified for any Government office after retirement.

   Which of the statements given above are correct?

   (A) (i) and (ii)
   (B) (ii) and (iii)
   (C) (iii) and (iv)
   (D) (i) and (iv)

2. Consider the following statements :

   (i) Lord Clement Attlee, the British Prime Minister, made a declaration on 15th of March, 1946 that a British Cabinet Mission would visit India to make recommendations about constitutional reforms to be introduced in India.

   (ii) The Cabinet Mission comprised of Lord Mountbatten, Stafford Cripps and A. V. Alexander.

   (iii) The Muslim League did not accept the Cabinet Mission Plan.

   (iv) The Indian National Congress partially accepted the plan.

   Which of the statements given above are correct?

   (A) (i) and (ii) only
   (B) (i) and (iv) only
   (C) (ii) and (iii) only
   (D) All of the above

3. In which case, the Supreme Court of India held that the Preamble is a part of the Constitution?

   (A) Kesavananda Bharati Case
   (B) Golaknath Case
   (C) Berubari Case
   (D) Minerva Mills Case

4. Which among the following is *not* a subject of State List of the Constitution?

   (A) Public Health and Sanitation
   (B) Public Order
   (C) Police
   (D) Inter-State Trade and Commerce

5. Which of the following Articles of the Constitution are correctly matched?

   (i) Article 253 : Legislation for giving effect to international agreements

   (ii) Article 259 : Control of the Union over the States in certain cases

   (iii) Article 275 : Grants from the Union to certain States

   (iv) Article 276 : The President of India can constitute the Finance Commission

   Select the correct answer from the given codes.

   (A) (i) and (ii)
   (B) (i) and (iii)
   (C) (ii) and (iii)
   (D) (ii) and (iv)

6. Which of the following is a part of the Liberal Principles of the Directive Principles of the State Policy enshrined in the Part IV of the Constitution?

(A) To secure equal pay for equal work of men as well as women

(B) To provide adequate means of livelihood to all citizens

(C) Introduction of a uniform civil code for the country

(D) The prohibition of intoxicating drugs and drinks

7. Who administers the oath of office to the Governor of a State?

(A) The Chief Justice of the Supreme Court

(B) The Chief Justice of the concerned State High Court

(C) The President of India

(D) The Chief Minister

8. Consider the following statements :

(i) The Government of India Act, 1935 introduced provincial autonomy and abolished dyarchy.

(ii) The Government of India Act, 1935 was opposed by the Indian National Congress.

(iii) Mahatma Gandhi remarked about the Act that "It was a new charter of bondage".

(iv) The Government of India Act, 1935 led to the separation of Burma from British India.

Which of the statements given above are correct?

(A) (i) and (ii) only

(B) (i) and (iii) only

(C) (i), (ii) and (iv) only

(D) All of the above

9. Which among the following is **not** a location of a sacred forest?

(A) Khasi and Jaintia Hills in Meghalaya

(B) Aravalli Hills in Rajasthan

(C) Dima Hasao in Assam

(D) All of the above

10. Which among the following major lakes of India are correctly matched with their locations?

(i) Ukai Lake   : Maharashtra

(ii) Kolleru Lake   : Kerala

(iii) Roopkund Lake : Uttarakhand

(iv) Badkhal Lake   : Haryana

Select the correct answer from the given codes.

(A) (i) and (ii)

(B) (ii) and (iii)

(C) (iii) and (iv)

(D) (i) and (iv)

11. Which of the following statements about the Si-Donyi festival is correct?

(A) Si-Donyi festival is celebrated in the State of Nagaland.

(B) Si-Donyi festival is celebrated in the State of Mizoram.

(C) Si-Donyi festival is celebrated by the Karbi Community of Assam.

(D) Si-Donyi festival is dedicated to the earth and the sun.

12. Pakhui Wildlife Sanctuary is located in

(A) Sikkim

(B) Arunachal Pradesh

(C) Nagaland

(D) Mizoram

13. Risa is a traditional attire of

(A) Tripura

(B) Manipur

(C) Sikkim

(D) Assam

14. Consider the following statements :

(i) Hargila bird (greater adjutant) is mostly found in Assam and to a small extent in Bihar and Cambodia.

(ii) Hargila bird is a member of stork family.

(iii) Most of the global population of the Hargila bird is found in Assam.

(iv) It is 'endangered' on the IUCN's Red List.

Which of the statements given above are correct?

(A) (i) and (ii) only

(B) (ii) and (iii) only

(C) (i) and (iii) only

(D) All of the above

15. Sillimanite, which is used in automobile industries, is found in which of the following districts of Assam?

(A) Dibrugarh

(B) Tinsukia

(C) Karbi Anglong

(D) Baksa

16. Which of the following tributaries of the river Brahmaputra is *not* in the north bank of the river?

(A) Subansiri   (B) Pagladiya

(C) Manas   (D) Digaru

17. Consider the following statements :

(i) The Mahalwari System of land revenue was introduced by Thomas Munro and was recommended by Charles Reed.

(ii) In Mahalwari System, along with the village communities, the landlords were jointly responsible for the payment of taxes.

(iii) In Mahalwari System, a direct settlement was made between the Government and the Ryot (cultivator).

(iv) The Mahalwari System was introduced in the Gangetic Valley, Uttar Pradesh, North-West Frontier Province, parts of Central India and Punjab.

Which of the statements given above are correct?

(A) (i) and (iii)

(B) (ii) and (iv)

(C) (iii) and (iv)

(D) None of the above

18. Which of the following was a significant step towards reinforcing 'Hindu-Muslim' unity in the Pre-Independence India?

(A) Swadeshi Movement

(B) Home Rule Movement

(C) Lucknow Pact

(D) August Declaration

19. Which Ahom King invited Krishnaram Bhattacharya from Nadia District in Bengal, promising the care of the Kamakhya Temple to him?

(A) Swargadeo Kamaleswar Singha

(B) Swargadeo Rudra Singha

(C) Swargadeo Gadadhar Singha

(D) Swargadeo Udayaditya Singha

20. Which of the following Indian social reformers contributed in persuading the British Government to introduce the Native Marriage Act of 1872?

(A) Raja Ram Mohan Roy

(B) Keshab Chandra Sen

(C) Ishwar Chandra Vidyasagar

(D) Swami Dayananda Saraswati

21. Identify the correct chronological sequence of the Gandhian era movements.

(A) Champaran Campaign— Non-Cooperation and Khilafat Movement—Quit India Movement—Civil Disobedience Movement

(B) Civil Disobedience Movement— Champaran Campaign—Quit India Movement—Non-Cooperation and Khilafat Movement

(C) Champaran Campaign—Non-Cooperation and Khilafat Movement—Civil Disobedience Movement—Quit India Movement

(D) Non-Cooperation and Khilafat Movement—Champaran Campaign—Quit India Movement—Civil Disobedience Movement

22. E. V. Ramasamy, commonly known as Periyar, was the head of Self-Respect Movement in which State?

(A) Kerala

(B) Karnataka

(C) Andhra Pradesh

(D) Tamil Nadu

23. Consider the following statements :

(i) Ariyannur Kudakkallu is an important archaeological site of Megalith culture in Karnataka.

(ii) Ariyannur Kudakkallu is an important archaeological site of Megalith culture in Kerala.

(iii) Megalith is the combination of Greek words mega (=great) and lithos (=stone).

(iv) In 1947, archaeologist R. E. M. Wheeler excavated Brahmagiri situated in Chitradurga district of Karnataka.

Which of the statements given above are correct?

(A) (i) and (ii)

(B) (ii) and (iii) only

(C) (iii) and (iv) only

(D) (ii), (iii) and (iv)

24. Who was the first Indian in the Council of the Governor-General in British India?

(A) Raja Ram Mohan Roy

(B) Satyendra Prasanna Sinha

(C) Pandit Madan Mohan Malaviya

(D) Dadabhai Naoroji

25. The project RE-HAB is related to

(A) artificial flood mitigation

(B) sustainable solution to human-elephant conflicts

(C) rehabilitation of refugees from Burma

(D) rehabilitation of Chakma refugees

26. Consider the following statements :

(i) The International Union for Conservation of Nature (IUCN) is headquartered in Berlin, Germany.

(ii) The IUCN was founded in 1948.

(iii) The IUCN prepares the list of threatened species.

(iv) The Himalayan Wolf has been assessed for the first time in the IUCN's Red List and categorised as 'vulnerable'.

Which of the statements given above are correct?

(A) (i) and (ii) only

(B) (ii) and (iii) only

(C) (ii), (iii) and (iv) only

(D) All of the above

27. Which of the following languages is a medium of instruction in the foundational stage of school education in Assam?

(A) Munda   (B) Nagamese

(C) Santhali   (D) Dimasa

28. Which of the following gases contributes to the maximum of global warming?

(A) Nitrous oxide

(B) Chlorofluorocarbon

(C) Carbon dioxide

(D) Methane

29. One of the two new species recently identified in the Kaziranga National Park and Tiger Reserve was the Binturong, which is a

(A) bearcat

(B) reptile

(C) stork

(D) fish

30. Consider the following statements :

(i) YUVIKA is the name of the Annual Youth Festival organised by the IIT, Delhi.

(ii) YUVIKA is a special programme for schoolchildren organised by the Indian Space Research Organisation.

(iii) YUVIKA is a special programme for fresh engineering graduates organised by the Indian Space Research Organisation.

(iv) The full form of YUVIKA is YUva VIgyani KAryakram.

Which of the statements given above is/are correct?

(A) (i)

(B) (ii) only

(C) (ii) and (iii)

(D) (ii) and (iv)

31. Consider the following statements :

(i) PM-DevINE is a central sector development scheme.

(ii) PM-DevINE initiative is for the North-East India only.

(iii) PM-DevINE was introduced in 2022–2023.

(iv) PM-DevINE gets 100% central funding.

Which of the statements given above is/are correct?

(A) (i) only

(B) (i) and (ii) only

(C) (i), (ii) and (iii) only

(D) All of the above

32. Which of the following statements about Dosti 16 is correct?

(A) Dosti 16 is the 16th edition of the bilateral trade talks between India and Bhutan.

(B) Dosti 16 is the 16th edition of the bilateral trade talks between India and Nepal.

(C) Dosti 16 is the 16th edition of the joint maritime exercise involving India and Bangladesh.

(D) Dosti 16 is the 16th edition of the joint maritime exercise between India, Sri Lanka and Maldives.

33. Consider the following statements :

(i) One of the principles of quantum mechanics used in quantum computational technology is quantum entanglement.

(ii) One of the principles of quantum mechanics used in quantum computational technology is Pauli's exclusion principle.

(iii) One of the principles of quantum mechanics used in quantum computational technology is Heisenberg's uncertainty principle.

(iv) One of the principles of quantum mechanics used in quantum computational technology is the Dirac-Frenkel variational principle.

Which of the statements given above is/are correct?

(A) (i)

(B) (ii)

(C) (iii) only

(D) (iii) and (iv)

34. Consider the following statements :

(i) Python is a programming language which can be used in artificial intelligence applications.

(ii) Python is a programming language which cannot be used in artificial intelligence applications.

(iii) R is a programming language which can be used in artificial intelligence applications.

(iv) R is a programming language which cannot be used in artificial intelligence applications.

Which of the statements given above are correct?

(A) (i) and (iv)

(B) (i) and (iii)

(C) (ii) and (iv)

(D) (ii) and (iii)

35. Consider the following statements :

(i) Unix is an operating system.

(ii) Unix is a programming language.

(iii) Linux is often considered a Unix-like system.

(iv) Unix was developed at Caltech.

Which of the statements given above is/are correct?

(A) (i) only

(B) (ii) only

(C) (i) and (iii)

(D) (ii) and (iv)

36. Consider the following statements :

(i) A file extension indicates the type of a computer file.

(ii) File extension bmp indicates a binary compressed file.

(iii) File extension avi means audio interchange file.

(iv) File extension avi means audio video interleave, a movie or sound file.

Which of the statements given above is/are correct?

(A) (i) only

(B) (i) and (ii)

(C) (i) and (iii)

(D) (i) and (iv)

37. Which of the following statements about the computer security parlance is correct?

(A) In computer security parlance, a white hat is a malicious virus.

(B) In computer security parlance, a white hat is a person who designs and builds firewall restrictions for a computer network.

(C) In computer security parlance, a white hat is an ethical hacker.

(D) In computer security parlance, a white hat is a malicious hacker.

38. Which of the following statements about Blu-ray is correct?

(A) In computer parlance, Blu-ray is a storage device.

(B) In computer parlance, Blu-ray is a security device.

(C) In computer parlance, Blu-ray is a memory device.

(D) Blu-ray is not a computer term; it is a type of marine creature.

39. Which of the following is **not** a flavour of Linux?

(A) Ubuntu   (B) Solaris

(C) Gentoo   (D) Fedora

40. Consider the following statements :

(i) In computer parlance, daemon is a malicious virus of enormous damaging capabilities.

(ii) In computer parlance, daemon is an invisible storage device.

(iii) In computer parlance, daemon is a process in an operating system that runs in the background.

(iv) The use of the word daemon in computer parlance was inspired by Maxwell's demon of physics and thermodynamics.

Which of the statements given above is/are correct?

(A) (i)

(B) (ii)

(C) (iii) only

(D) (iii) and (iv)

41. Let A be a 2×2 real matrix with det $A = 1$ and trace $(A) = 3$, then what is the value of trace (A^2)?

(A) 2

(B) 10

(C) 9

(D) 7

42. If $A = \begin{bmatrix} 3 & -2 \\ 2 & -1 \end{bmatrix}$, then A^{20} equals

(A) $\begin{bmatrix} 41 & 40 \\ -40 & -39 \end{bmatrix}$

(B) $\begin{bmatrix} 41 & -40 \\ 40 & -39 \end{bmatrix}$

(C) $\begin{bmatrix} 41 & -40 \\ -40 & -39 \end{bmatrix}$

(D) $\begin{bmatrix} 41 & 40 \\ 40 & -39 \end{bmatrix}$

43. What is the sum of the series?

$$\left(\frac{1}{2 \cdot 3} + \frac{1}{2^2 \cdot 3} \right) + \left(\frac{1}{2^2 \cdot 3^2} + \frac{1}{2^3 \cdot 3^2} \right) + \cdots$$
$$+ \left(\frac{1}{2^a \cdot 3^a} + \frac{1}{2^{a+1} \cdot 3^a} \right) + \cdots$$

(A) $\frac{3}{8}$

(B) $\frac{3}{10}$

(C) $\frac{3}{14}$

(D) $\frac{3}{16}$

44. Given $\{a_n\}$, $\{b_n\}$ two monotonous sequence of real numbers and that $\Sigma a_n b_n$ is convergent, then which of the following is true?

(A) Σa_n is convergent and also Σb_n is convergent

(B) Only Σa_n is convergent

(C) $\{a_n\}$ is bounded and also $\{b_n\}$ is bounded

(D) None of the above

45. Which of the following functions is uniformly continuous on $(0, 1)$?

(A) $\sin\left(\frac{1}{x} \right)$

(B) $e^{-\frac{1}{x^2}}$

(C) $e^x \sin\left(\frac{\pi}{x} \right)$

(D) $\cos(x) \cos\left(\frac{\pi}{x} \right)$

46. The principal value of $(-1)^{\left(\frac{-2i}{\pi} \right)}$ is

(A) e^2

(B) e^{2i}

(C) e^{-2i}

(D) e^{-2}

47. The value of $\text{Re}(f(z))$ for $f(z) = 2iz + 6\bar{z}$, where $z = x + iy$, is

(A) $6x + 2y$

(B) $6x - 2y$

(C) $\dfrac{6x}{2y}$

(D) None of the above

48. Find the value of $I = \int_C z\,dz$, where $C : |z| = 1$.

(A) 0

(B) 1

(C) 2

(D) 3

49. If H and K are normal subgroups of G, then which of the following is true?

(A) $H \cap K$ and HK are normal subgroups in G

(B) HK and $H \cup K$ are normal subgroups in G

(C) $H \cap K$ is normal but HK is not normal

(D) $H \cup K$ is normal but HK is not normal

50. The non-zero value of n for which the differential equation

$$(3xy^2 + n^2x^2y)\,dx + (nx^3 + 3x^2y)\,dy = 0$$

becomes exact is

(A) -3 (B) -2

(C) 2 (D) 3

51. The integrating factor of the differential equation

$$\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}} \right)\frac{dy}{dx} = 1$$

is

(A) $e^{2\sqrt{x}}$ (B) $e^{-2\sqrt{x}}$

(C) $e^{\sqrt{x}}$ (D) $e^{-\sqrt{x}}$

52. If x^3y^2 is an integrating factor of

$$(6y^2 + axy)\,dx + (6xy + bx^2)\,dy = 0$$

where $a, b \in R$, then

(A) $3a - 5b = 0$

(B) $2a - b = 0$

(C) $3a + 5b = 0$

(D) $2a + b = 0$

53. $\lim\limits_{x \to 0} (\tan x \log x)$ is

(A) ∞ (B) 1

(C) 0 (D) e

54. The angle of intersection of the curves $x^2 = 4y$ and $y^2 = 4x$ is

(A) $\dfrac{3}{4}$ (B) $\dfrac{4}{3}$

(C) $\tan^{-1}\dfrac{3}{4}$ (D) $\tan^{-1}\dfrac{4}{3}$

55. In polar coordinates, $x = r\cos\theta$ and $y = r\sin\theta$. Then $\dfrac{\partial(x,\,y)}{\partial(r,\,\theta)}$ is

(A) r

(B) r^2

(C) $r^2 \sin\theta$

(D) $r^2 \cos\theta$

56. The simple pole of

$$f(z) = \frac{1}{\sin z - \cos z}$$

is

(A) π

(B) $\dfrac{\pi}{3}$

(C) $\dfrac{\pi}{4}$

(D) None of the above

57. The

$$\lim_{n\to\infty}\left(1 + \frac{1}{2^n} + \frac{1}{3^n} + \cdots + \frac{1}{2023^n}\right)^{1/n}$$

is

(A) 1   (B) 2

(C) 3   (D) 4

58. The function $|\bar{z}|^2$ is

(A) analytic

(B) differentiable at $z = 0$

(C) not analytic

(D) continuous

59. Let

$$A = \begin{pmatrix} 2 & -1 & 3 \\ 2 & -1 & 3 \\ 3 & 2 & -1 \end{pmatrix}$$

then the largest eigenvalue of A is

(A) 1   (B) 2

(C) 3   (D) 4

60. Let C be the set of complex numbers. Let for any $z = (x,\, y)$ in C, $z \cdot \bar{z} = z$, then $\bar{z}$ is equal to

(A) $(0,\, 1)$

(B) $(1,\, 0)$

(C) $(-1,\, 1)$

(D) $(1,\, 1)$

61. The number of stereoisomers of D-Glucose is

(A) 26   (B) 24
(C) 12   (D) 16

62. The widely used method for the determination of protein content of meat and animal food is

(A) Mohr method

(B) Kjeldahl method

(C) McBride method

(D) Liebig method

63. Which one the following reactions is *not* stereospecific?

(A) S_N1

(B) S_N2

(C) Hydrogenation with Pd/H_2

(D) Addition of halogens to olefins

64. In examining the structure of molecules, it was discovered that the motion of the nuclei could be neglected and it was sufficient to consider the motion and the distribution of the electrons alone for a molecule. This assumption is based on

(A) Born-Oppenheimer
                          approximation

(B) Hittorf method

(C) VSEPR theory

(D) Euler's chain relation

65. Which of the following elements is *not* a component of Wood's metal?

(A) Bismuth   (B) Lead
(C) Tin   (D) Titanium

66. The test which is *not* applied to identify an aldehyde or ketone is

(A) Tollens' test

(B) Fehling's test

(C) Baeyer's test

(D) Benedict's test

67. The nucleophilic aromatic substitution that can occur on a benzene ring is affected by the substituent group(s) present. Which one of the following is correct for such a substituent group?

(A) —CN, electron withdrawing

(B) —NO$_2$, stabilises carbanion, activates the ring

(C) —COOH, electron releasing, activates the ring

(D) —R, destabilises carbonation, electron withdrawing

68. To distinguish among primary, secondary and tertiary alcohols, one would use which of the following experimental methods?

(A) Sandmeyer's reaction

(B) Lucas test

(C) Tollens' test

(D) Wittig reaction

69. The coordination number of cobalt in $[Co(NH_3)_3Cl_3]^0$ is

(A) 3   (B) 6
(C) 4   (D) 1

70. In the octahedral crystal field, the *d*-orbitals of a metal will be split into

(A) 2 levels   (B) 3 levels

(C) 4 levels   (D) 6 levels

71. Among the following reagents, which one will be able to react with benzene ring?

(A) HI

(B) Hot $KMnO_4$ solution

(C) O_3/Zn, H^+

(D) Cold Br_2/CCl_4 solution

72. Which of the following is closest to the pH of 10^{-4} *M* NaOH solution?

(A) 11   (B) 10·2

(C) 7   (D) 12

73. Which of the elements given below is the most powerful oxidising agent?

(A) Fluorine   (B) Iodine

(C) Chlorine   (D) Hydrogen

74. According to the molecular orbital theory, which of the following is **not** a viable molecule?

(A) He_2^{2+} (B) He_2^+

(C) H_2^- (D) H_2^{2-}

75. The structure of IF_5 is based on which configuration?

(A) Tetrahedral

(B) Trigonal bipyramidal

(C) Pentagonal bipyramidal

(D) Octahedral

76. How many isomers are there for butanone?

(A) None   (B) 1

(C) 2   (D) 3

77. Aufbau principle is one that governs

(A) entropy

(B) vapour pressure

(C) Coulomb's potential

(D) electronic configuration

78. Which of the following statements concerning noble gases helium (He) and neon (Ne) is correct?

(A) The boiling point of He is greater than that of Ne.

(B) Both have 8 electrons in their outer shells.

(C) Both have very low boiling points.

(D) Both are used for filling electric gas lamps.

79. What type of orbital hybridisation is used by the central atom of NH_2^- ?

(A) sp (B) sp^2

(C) sp^3 (D) sp^3d

80. What is the right electronic configuration of an element with 24 electrons?

(A) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$

(B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$

(C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$

(D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 4d^5$

81. Which of the following physical parameters has the same dimensions as that of the Planck's constant?

(A) Linear momentum

(B) Angular momentum

(C) Energy

(D) Entropy

82. A particle describes a circular orbit having radius r under the influence of an attractive central force directed towards a point on the circle. The force is inversely proportional to

(A) r^2

(B) r^3

(C) r^4

(D) r^5

83. If the radius of the earth contracts to half of its present value without any change in its mass, what will be the new duration of the day in hours?

(A) 6 hours

(B) 8 hours

(C) 10 hours

(D) 12 hours

84. A car starts from rest to cover a distance s. The coefficient of friction between the road and the tyres is μ. The minimum time in which the car can cover the distance is proportional to

(A) μ

(B) $\dfrac{1}{\mu}$

(C) $\sqrt{\mu}$

(D) $\dfrac{1}{\sqrt{\mu}}$

85. At what temperature the value of the surface tension of water will be the minimum?

(A) 75 °C

(B) 60 °C

(C) 40 °C

(D) 4 °C

86. How many times a diatomic gas should be expanded adiabatically so as to reduce the root-mean-square velocity to half?

(A) 64

(B) 32

(C) 16

(D) 8

87. Internal energy of n_1 mol of hydrogen at temperature T is equal to that of n_2 mol of helium at temperature $2T$. The ratio $\dfrac{n_1}{n_2}$ is

(A) $\dfrac{3}{5}$

(B) $\dfrac{2}{3}$

(C) $\dfrac{6}{5}$

(D) $\dfrac{3}{7}$

88. As the temperature of air increases, the speed of sound in air

(A) increases

(B) decreases

(C) does not change

(D) None of the above

89. The intensity of a source of sound is increased by a factor of 100. The increase of the intensity level is

(A) 2 dB (B) 10 dB

(C) 12 dB (D) 20 dB

90. Two coherent sources of monochromatic light of wavelength 6000 Å produces an interference pattern on a screen kept at a distance of 1 m from them. The distance between two consecutive bright fringes on the screen is 0·5 mm. Then the distance between the two coherent sources is

(A) 12 mm (B) 1·2 mm

(C) 16 mm (D) 1·6 mm

91. The resolving power of an optical instrument is limited by the phenomena of

(A) interference

(B) diffraction

(C) dispersion

(D) polarisation

92. The electric field due to an infinite uniform plane sheet of charge at a distance r from the sheet is

(A) proportional to r

(B) proportional to $\dfrac{1}{r}$

(C) proportional to $\dfrac{1}{r^2}$

(D) independent of r

93. In an L-C-R series circuit, the capacitance is changed from C to $4C$. For the same resonant frequency, the inductance should be changed from L to

(A) $\dfrac{L}{4}$

(B) $\dfrac{L}{2}$

(C) $2L$

(D) $4L$

94. The magnitude of potential energy of the electron in a permitted orbit of hydrogen atoms is

(A) half of its kinetic energy

(B) two times of its kinetic energy

(C) equal to its kinetic energy

(D) square root of its kinetic energy

95. If λ_1 and λ_2 be the wavelengths of an electron accelerated by potential difference of 49 volts and 100 volts respectively, then the relation between λ_1 and λ_2 is

(A) $\lambda_1 = \dfrac{7}{10}\lambda_2$

(B) $\lambda_1 = \dfrac{10}{7}\lambda_2$

(C) $\lambda_1 = \dfrac{7}{100}\lambda_2$

(D) $\lambda_1 = \dfrac{49}{100}\lambda_2$

96. What is the decay constant of a nucleus whose half-life is 2·1 min?

(A) 0·33 min^{-1}

(B) 3·3 min^{-1}

(C) 33 min^{-1}

(D) None of the above

97. Which of the following is **not** made up of quarks?

(A) Neutron

(B) Proton

(C) Hadron

(D) π-meson

98. The minimum number of NOR gates to perform the function of XOR gate is

(A) 1

(B) 3

(C) 5

(D) 7

99. According to the BCS theory, the critical temperature, T_c of a superconducting material generally varies with its isotopic mass M as

(A) $T_c \propto M^{\frac{1}{2}}$

(B) $T_c \propto M^{-\frac{1}{2}}$

(C) $T_c \propto M^{\frac{3}{2}}$

(D) $T_c \propto M^{-\frac{3}{2}}$

100. A device which acts as a voltage variable capacitor is a

(A) Varactor diode

(B) Schottky diode

(C) Zener diode

(D) Gunn diode

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