Scientific Asstt.

SAN/22

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PRELIMINARY SCREENING

TEST BOOKLET

TEST BOOKLET SERIES

B

Time allowed : $1\frac{1}{2}$ hours

Full marks : 100

Answer ***all*** the questions.

Questions are of equal value.

Serial No. 0446 ..... ***Roll No.:***

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INSTRUCTIONS

Candidates should read the following instructions carefully before answering the questions:

1. This booklet consists of 12 pages including this front page, containing 100 questions. **Verify the Page Nos. and Test Booklet series on each page and bring at once to the Invigilator's notice any discrepancy.**
2. Answers will have to be given in the OMR Sheet supplied for the purpose.
3. Before you proceed to mark in the OMR Sheet in response to various items in the Test Booklet, you have to fill in some particulars in the OMR Sheet. ***Do not fold the OMR Sheet as this will result in error in your marks.***
4. All questions are of multiple-choice answer-type. You will find ***four*** probable answers **(A)**, **(B)**, **(C)** and **(D)** against each question. Find out which of the four answers appears to you to be correct or the best. Now darken the circle corresponding to the letter of the selected answer in the OMR Sheet with **Black Ball Point Pen.**
5. One and only one circle is to be fully blackened for answer. Any spot in any other circle (multiple circle) or in wrong circle will be considered as wrong answer. If more than one circle is encoded for a particular answer, it will be treated as a wrong answer. Use of whitener is strictly prohibited.
6. ***There will be negative marking of $\frac{1}{3}$ mark for each wrong answer.***
7. ***There is a blank page at the end of this Booklet for Rough Work.***
8. ***The OMR Sheet should be handed over to the Invigilator before leaving the Examination Hall. You are permitted to take away the used Test Booklet after completion of the examination.***

1. If the annual rate of simple interest increases from 10% to 12½%, a man's yearly income increases by Rs. 1250. His principal (in Rs) is

(A) 45,000
(B) 50,000
(C) 60,000
(D) 65,000

2. The angular momentum of a system of particles is not conserved when

(A) a net external torque is acting upon the system.
(B) a net external force is acting upon the system.
(C) a net external impulse is acting upon the system.
(D) None of the above

3. Fill in the blank with the correct alternative:

After using the computer for a long time, looking into the distance for about five minutes _____ the eyes.

(A) relax
(B) relaxes
(C) relaxing
(D) have been relaxing

4. Who has become the first Indian Folk singer to walk Red Carpet in Cannes Film Festival in 2022?

(A) Prahlad Tripanya
(B) Kalpana Patowary
(C) Rabbi Shergill
(D) Mame Khan

5. In the ground state, carbon atom has how many unpaired electrons?

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

6. An intrinsic semiconductor is doped with donor impurity. This results in the production of

(A) p-type semiconductor
(B) n-type semiconductor
(C) insulator
(D) optical isolator

7. In India, the electric supply line for domestic use operates at 220 V AC. In USA it is 110 V AC. If the resistance of a 100 W bulb in India is R, the resistance of a 100 W bulb in USA is

(A) R/2
(B) 2R
(C) R/4
(D) R

8. A jet plane starts from rest with an acceleration of 4 ms^{-2} and makes a run for 30 s before taking off. The length of the runway is

(A) 1000 m
(B) 1800 m
(C) 2400 m
(D) 1600 m

9. A particle executes uniform circular motion with an angular momentum L. If the frequency of motion is doubled and the kinetic energy is halved, the angular momentum becomes

(A) L
(B) 2L
(C) L/2
(D) L/4

10. The hybridisation state of the carbon marked by $*$ in the compound $CH_3 - C \equiv \overset{*}{C}H$—

(A) sp^2
(B) sp
(C) sp^3
(D) sp^3d

11. $KF + HF \rightarrow KHF_2$, in the compound KHF_2, we found

(A) K^+, F^- and H^+
(B) K^+, F^- and HF
(C) K^+ and HF_2^-
(D) $[KHF]^+$ and F^-

12. India's First Tribal health observatory will be set up in

(A) Kerala
(B) Odisha
(C) Chhattisgarh
(D) Telangana

13. Minimum number of molecules present in—

(A) 7g N_2
(B) 2g N_2
(C) 16g NO_2
(D) 16g O_2

14. A pump can fill a tank with water in 2 hours. Because of a leak, it took $2\frac{1}{3}$ hours to fill the tank. The leak can drain all the water of the tank in

(A) $4\frac{1}{3}$ hrs
(B) 7 hrs
(C) 8 hrs
(D) 14 hrs

15. Change into indirect speech:

The traveller said, "Is there anybody inside the house?"

(A) The traveller said, if there was anybody inside the house.
(B) The traveller enquired whether there were anybody inside the house.
(C) The traveller wanted to know if there was anybody inside the house.
(D) The traveller wanted to know if there had been anybody inside the house.

16. Name of the cyclone Asani was suggested by which country?

(A) Nepal
(B) Bangladesh
(C) Bhutan
(D) Sri Lanka

17. Hybridisation state of carbon in $\overset{\ominus}{C}H_3$—

(A) *sp*
(B) sp^2
(C) sp^3
(D) sp^3d

18. In the word 'MATHEMATICS', if 'M' is replaced by 'P', 'A' by 'D', 'T' by 'W' and so on, then the new arrangement of the letters will have which letter in the 9th place from left?

(A) K
(B) F
(C) L
(D) W

19. Which air pollutant does not evolve from motor vehicles?

(A) Carbon monoxide
(B) Formaldehyde
(C) Fly ash
(D) Sulphur dioxide

20. A can finish a work in 18 days and B can do the same work in 15 days. B worked for 10 days and left the job. In how many days, can A alone finish the remaining work?

(A) 5
(B) 5½
(C) 6
(D) 8

21. Find the KC of following reaction:

$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

(A) $L.mol^{-1}$
(B) $mol.L^{-1}$
(C) $(mol.L^{-1})^2$
(D) $(L.mol^{-1})^2$

22. A shopkeeper sells 25 articles at Rs. 45 per article after giving 10% discount and earns 50% profit. If the discount is not given, the profit gained is

(A) 60%

(B) $60\frac{2}{3}\%$

(C) 66%

(D) $66\frac{2}{3}\%$

23. $CH_3 - I \xrightarrow{\text{aq. KOH}} CH_3—OH + KI$; mechanism of this reaction—

(A) Free radical

(B) SN^1

(C) SN^2

(D) All are possible.

24. $CH_3—\overset{\overset{O}{\|}}{C}—CH_3$ and $CH_3—\overset{\overset{OH}{|}}{C}=CH_2$, they are

(A) *cis*-isomer

(B) *trans*-isomer

(C) metamer

(D) tautomer

25. Which institution has announced to set up 'Yuva Tourism Clubs'?

(A) CBSE

(B) UGC

(C) ISRO

(D) NITI Aayog

26. Which university from West Bengal is collaborating with Indian Space Research Organisation (ISRO) for the Chandrayaan 3 mission?

(A) Calcutta University

(B) Presidency University

(C) Jadavpur University

(D) North Bengal University

27. $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$ for this reversible reaction—

(A) $K_P = K_C$

(B) $K_P > K_C$

(C) $K_P < K_C$

(D) $K_P = K_C^2$

28. Number of σ and π bond present in but-1-en-3-yne—

(A) 5, 5

(B) 6, 4

(C) 7, 3

(D) 7, 4

29. The gas leaked from a storage tank of the Union Carbide Plant in Bhopal gas tragedy by

(A) phosgene

(B) methyl isocyanate

(C) methylamine

(D) ammonia

30. The geostationary satellites are also called synchronous satellites since

(A) they are stationary in space.

(B) they have the same angular speed as that of earth about its own axis.

(C) they are synchronised with the motion of moon.

(D) they move in arbitrary orbits.

31. One should never look down upon the <u>poor</u>. The verb form of the underlined word is

(A) impoverished

(B) poverished

(C) poorly

(D) poverty

32. 15 men take 21 days of 8 hours each to do a piece of work. How many days of 6 hours each would 21 women take, if 3 women do as much work as 2 men?

(A) 18
(B) 20
(C) 25
(D) 30

33. When ozone transforms to oxygen molecule, entropy

(A) decreases
(B) increases
(C) becomes zero
(D) remains same

34. $_{92}U^{238}$ first emits an α-particle and then emits a β-particle. If the resultant nuclei have a mass number A and atomic number Z, the values of A and Z will be

(A) A = 234, Z = 91
(B) A = 238, Z = 92
(C) A = 235, Z = 92
(D) A = 228, Z = 89

35. A's salary is 40% of B's salary which is 25% of C's salary. What percentage of C's salary is A's salary?

(A) 5%
(B) 10%
(C) 15%
(D) 20%

36. Two men starting from the same place walk at the rate of 5 kmph and 5·5 kmph respectively. What time will they take to be 8·5 km apart, if they walk in the same direction?

(A) 4 hrs 15 min
(B) 8 hrs 30 min
(C) 16 hrs
(D) 17 hrs

37. Formula of a gaseous molecule is $(CO)_x$, vapour density is 70. Value of x is

(A) 4
(B) 5
(C) 6
(D) 7

38. The average age of students of a class is 15·8 years. The average age of boys in the class is 16·4 years and that of the girls is 15·4 years. The ratio of the number of boys to the number of girls in the class is

(A) 1 : 2
(B) 2 : 3
(C) 3 : 4
(D) 3 : 5

39. What is DDT among the following?

(A) a fertilizer
(B) Biodegradable pollutant
(C) Non-biodegradable pollutant
(D) Greenhouse gas

40. When is National Education Day celebrated?

(A) 8th November
(B) 9th November
(C) 10th November
(D) 11th November

41. Change into passive voice:
We saw you and him.

(A) You and him was seen by us.
(B) You and him were seen by us.
(C) You and he had been seen by us.
(D) You and he were seen by us.

42. A number when divided by 5 leaves a remainder 3. What is the remainder when the square of the same number is divided by 5?

(A) 2
(B) 3
(C) 4
(D) 9

43. The reverse saturation current in a p-n junction diode is caused due to

(A) minority charge carriers.
(B) majority charge carriers.
(C) photons.
(D) phonons.

44. Metal ion responsible for the Minamata disease is

(A) Co^{2+}
(B) Hg^{2+}
(C) Cu^{2+}
(D) Zn^{2+}

45. The correct states of hybridisation of C_2 and C_3 in compound $CH_3 - CH = C = CH - CH_3$ are

(A) sp, sp^3
(B) sp^2, sp
(C) sp^2, sp^2
(D) sp, sp

46. Which of the following is set to be India's first Vertical Lift Rail Sea Bridge?

(A) Zuari Bridge
(B) Pamban Bridge
(C) Havelock Bridge
(D) Bogibeel Bridge

47. Who proposed the Preamble before the Drafting Committee of the Constitution?

(A) Jawaharlal Nehru
(B) B.R. Ambedkar
(C) B.N. Rau
(D) Mahatma Gandhi

48. The world's smallest country is

(A) Myanmar
(B) Afghanistan
(C) Maldives
(D) Vatican City

49. Which hybridization shows octahedral geometry?

(A) sp^3
(B) sp^3d
(C) sp^3d^2
(D) sp^3d^3

50. Each member of a picnic party contributed twice as many rupees as the total number of members and the total collection was Rs. 3042. The number of members present in the party was

(A) 2
(B) 32
(C) 40
(D) 39

51. Change the following sentence into positive degree:

Sunil Gavaskar was one of the greatest opening batsmen of India.

(A) Very few opening batsmen of India were as great as Sunil Gavaskar.
(B) Sunil Gavaskar was better than most other opening batsmen of India.
(C) Very few opening batsmen of India were better than Sunil Gavaskar.
(D) Sunil Gavaskar was the greatest Indian opening batsman.

52. The current gain of transistor operating in common base mode is 0·96. If the emitter current is 10 mA, then the base current is

(A) 0·96 mA
(B) 10 μA
(C) 0·4 mA
(D) 0·6 mA

53. Which is not a transition metal?

(A) Silver
(B) Lead
(C) Tungsten
(D) Manganese

54. Mohan got married 9 years ago. Today his age is $1\frac{1}{3}$ times of his age at the time of his marriage. Find his present age.

(A) 12 years
(B) 27 years
(C) 36 years
(D) 45 years

55. Number of neutrons present in Zn^{2+} ion (Zn, mass no. – 70)

(A) 34
(B) 36
(C) 38
(D) 40

56. Which of the following country hosted the BRICS Cultural Ministers' Meeting in 2022?

(A) India
(B) Russia
(C) South Africa
(D) China

57. Aqueous solution of baking soda is

(A) mild acidic
(B) mild basic
(C) highly acidic
(D) neither acidic nor basic

58. A battery of emf 10 V and internal resistance 3 ohms is connected to a resistance. If the current in the circuit is 1 A, what is the value of the resistance?

(A) 13 Ohms
(B) 17 Ohms
(C) 7 Ohms
(D) 9 Ohms

59. Plutonium is a radioactive element having half-life of 24000 years. If 80 gm of Plutonium is stored for 96000 years, the amount that will remain is

(A) 20 gm
(B) 5 gm
(C) 40 gm
(D) 1 gm

60. Among the following, the one which is not a 'greenhouse gas' is

(A) N_2O
(B) CO_2
(C) CH_4
(D) O_2

61. Number of water molecule present in 0·0189 of water—

(A) $6{\cdot}023 \times 10^{23}$
(B) $6{\cdot}023 \times 10^{22}$
(C) $6{\cdot}023 \times 10^{21}$
(D) $6{\cdot}023 \times 10^{20}$

62. A silicon diode is connected in series with a 100 Ohms resistance across a 5 V battery. Under forward bias condition the voltage drop across the p-n junction is 0·6 V. The amount of current flowing through the diode is roughly

(A) 5 A
(B) 0·014 A
(C) 0·6 A
(D) 0·044 A

63. A and B invest in a business in the ratio 3:2. If 5% of the total profit goes to charity and A's share is Rs. 855, the total profit is

(A) Rs. 1425
(B) Rs. 1500
(C) Rs. 1537
(D) Rs. 1576

64. Convert into active voice:
Books are sold here.

(A) They sell books here.
(B) They are selling books here.
(C) They have been selling books here.
(D) Books are being sold here.

65. According to Bohr theory, the angular momentum of electron in 5th orbit is

(A) $0{\cdot}25\frac{h}{\pi}$
(B) $2{\cdot}5\frac{h}{\pi}$
(C) $5\frac{\pi}{h}$
(D) $0{\cdot}5\frac{h}{\pi}$

66. What is the cause of greenhouse effect?

(A) Soft X-ray
(B) Ultraviolet rays
(C) Hard X-ray
(D) Infra-red rays

67. A motorboat, whose speed is 15 km/hr in still water goes 30 km downstream and comes back in 4 hours 30 minutes. The speed of the stream (in km/hr) is

(A) 4
(B) 5
(C) 6
(D) 10

68. Oxidation number of 'N' in $(NH_4)SO_4$—

(A) $-\frac{1}{3}$
(B) –1
(C) +1
(D) –3

69. 15 litres of mixture contains 20% alcohol and the rest water. If 3 litres of water be mixed with it, the percentage of alcohol in the new mixture would be

(A) 15%
(B) $16\frac{2}{3}\%$
(C) $16\frac{1}{3}\%$
(D) $18\frac{1}{2}\%$

70. Which one of the following was the first fort constructed by the British in India?

(A) Fort William
(B) Fort St. George
(C) Fort St. David
(D) Fort St. Angelo

71. Which of the following has the highest affinity towards haemoglobin?

(A) CO
(B) NO
(C) O_2
(D) CO_2

72. Which set of quantum numbers for an electron of an atom is not possible?

(A) $3, 2, -2, \frac{1}{2}$

(B) $3, 2, -3, \frac{1}{2}$

(C) $4, 0, 0, \frac{1}{2}$

(D) $5, 3, 0, \frac{1}{2}$

73. Which of the following has net dipole moment?

(A) CCl_4

(B) BF_3

(C) CO_2

(D) NH_3

74. If the magnetic quantum number of a given atom is –3, then its principal quantum number will be

(A) 1

(B) 2

(C) 3

(D) 4

75. During the formation of chemical bond, energy of the system

(A) increases

(B) decreases

(C) does not change

(D) None of the above

76. Electron affinity is zero in

(A) O

(B) F

(C) N

(D) Ne

77. One kilowatt hour is equal to

(A) 36×10^5 J

(B) 36×10^4 J

(C) 36×10^{-2} J

(D) 36×10^{-4} J

78. At what rate of compound interest per annum will a sum of Rs. 1200 become Rs. 1348·32 in 2 years?

(A) 6%

(B) 6·5%

(C) 7%

(D) 7·5%

79. The current gain of a transistor in the common emitter mode is 80. If the base current is changed by 5 μA, the corresponding change in collector current will be

(A) 80 mA

(B) 80 μA

(C) 5 μA

(D) 400 μA

80. Fill in the blank with the correct preposition given below:

We must abide _____ the rules.

(A) by

(B) to

(C) for

(D) into

81. Which of the following state governments has launched a 'women-friendly tourism' project to establish women-friendly tourism centers and empower women?

(A) Kerala

(B) Karnataka

(C) Rajasthan

(D) Tamil Nadu

82. Under identical conditions, the SN^1 reaction will occur most efficiently with

(A) tert-butyl-chloride
(B) 1-chlorobutane
(C) 2-methyl-1-chloropropane
(D) 2-chlorobutane

83. A Galvanometer can be converted into an ammeter by connecting

(A) a small resistance in parallel.
(B) a small resistance in series.
(C) a large resistance in series.
(D) a large resistance in parallel.

84. What is the percentage of reservation upheld by the Supreme Court of India for the economically weaker section (EWS) with regard to education and public employment in India?

(A) 9%
(B) 8%
(C) 10%
(D) 6%

85. Choose the odd one out:

(A) PSVZ
(B) NQTW
(C) WZCF
(D) BEHK

86. Which of the following species is isoelectronic with Ne?

(A) O^{2-}
(B) F^{+}
(C) Mg
(D) Na

87. 'Atom' is related to 'Molecule', in the same way as 'Cell' is related to

(A) Matter
(B) Nucleus
(C) Organism
(D) Battery

88. An automobile engine generates 100 kW while rotating at a speed of 2400 rev/min. The associated torque is nearly

(A) 245 Nm
(B) 398 Nm
(C) 517 Nm
(D) 470 Nm

89. The α-rays are

(A) stream of electrons.
(B) stream of neutral particles.
(C) light rays.
(D) stream of charged particles emitted by nuclei.

90. Fill in the blanks with appropriate articles:

____ apple a day keeps _____ doctor away.

(A) An, the
(B) The, an
(C) A, a
(D) The, a

91. If 'Pigeon' is known as 'Sparrow', 'Sparrow' is known as 'Peacock', 'Peacock' is known as 'Parrot' and 'Parrot' is known as 'Crow', then what would be the name of Indian National Bird?

(A) Parrot
(B) Crow
(C) Peacock
(D) Pigeon

92. He is gone.

The sentence is in

(A) active voice
(B) passive voice
(C) quasi-passive voice
(D) None of the above

93. Who was recently elected as deputy chair of the Global System for Mobile communications Association (GSMA)?

(A) Jose Maria Alvarez-Pallete Lopez
(B) Gopal Vittal
(C) Sunil Mittal
(D) Sunil Mehta

94. The angle between the vectors $\vec{A} = 4\hat{i} - 2\hat{j} + 4\hat{k}$ and $\vec{B} = 3\hat{i} - 6\hat{j} - 2\hat{k}$ is

(A) 0°
(B) 45°
(C) $\cos^{-1}\left(\frac{17}{21}\right)$
(D) $\cos^{-1}\left(\frac{8}{21}\right)$

95. Which state first adopted the Panchayati Raj in India in 1959?

(A) Rajasthan
(B) Maharashtra
(C) Gujarat
(D) West Bengal

96. Change into negative:
The man is too old to work anymore.
(A) The man is too old that he cannot work anymore.
(B) The man is so old that he cannot work anymore.
(C) The man is so old that he can work no more.
(D) The man is too old that he cannot work no more.

97. Which crop is sown on the largest area in India?

(A) Rice
(B) Wheat
(C) Sugarcane
(D) Maize

98. Which one is the conjugate acid of NH_2^-?

(A) NH_3
(B) NH_2OH
(C) NH_4^-
(D) N_2H_4

99. A positive charge of 1 μC is moving with a speed of 2×10^6 m/s along the positive x direction. A magnetic field $\vec{B} = \left(0{\cdot}2\hat{j} + 0{\cdot}4\hat{k}\right)$ tesla is acting in the space. The magnetic force acting on the charge—

(A) $2\hat{k}$ Newton
(B) 0
(C) $\left(0{\cdot}4\hat{k} - 0{\cdot}8\hat{j}\right)$ Newton
(D) $\left(1{\cdot}2\hat{i} + 0{\cdot}7\hat{j}\right)$ Newton

100. Which of the following can act both as a Bronsted acid and a Bronsted base?

(A) NH_4^+
(B) HCO_3^-
(C) Cl^-
(D) CO_3^{2-}