

SCIENCE

1. In pure germanium crystal near the absolute zero of temperature....
- The conduction band is completely empty.
 - There are about 10^{17} free electrons per cubic meter.
 - The forbidden energy gap is 1.21 eV.
 - There are equal number of holes and electrons.
2. The circumference of a circular track is 400π m. If the optimum speed with which a vehicle can be driven along it is to be 20 m/s, the angle of banking of the road must be about. ($\pi = 3.142$)
- $\tan^{-1}(0.02)$
 - $\tan^{-1}(0.4)$
 - $\tan^{-1}(0.8)$
 - $\tan^{-1}(0.2)$
3. Fraunhofer diffraction pattern of a parallel beam of light wavelength (λ) passing through a narrow slit (width 'a') is observed on a screen using a convex lens (focal length 'f'). The angular half width of the central fringe is....
- $\frac{2\lambda f}{a}$
 - $\frac{\lambda f}{a}$
 - $\frac{2\lambda}{a}$
 - $\frac{\lambda}{a}$
4. A lubricating oil should have a low surface tension so that....
- There is reduction in the contact area.
 - The oil gives a good shine.
 - The oil gets absorbed into the surface.
 - The oil can spread over a large area.
5. A magnetic field can be produced by....
- Only a steady electric current.
 - Only a steady electric field.
 - Only a time - varying electric field.
 - Both steady electric current and time varying electric field.
6. When the temperature of an enclosed gas is increased by 2°C , its pressure increases by 0.5 %. Then the initial temperature of the gas was....
- 250 k
 - 275 k
 - 300 k
 - 400 k
7. A choke coil is preferred over a resistor in an AC circuit because....
- It is cheaper than a resistor.
 - It lasts longer than a resistor.
 - The resistor may overheat and melt.
 - It brings about a voltage drop with negligible power consumption.
8. The total energy of a satellite of mass m orbiting with a critical orbiting speed V is....
- $-mv^2$
 - $-\frac{1}{2}mv^2$
 - $\frac{1}{2}mv^2$
 - mv^2
9. Match Column I with Column II
- | Column I | Column II |
|---------------------|--------------------|
| (J) Lipids | (P) Vitamin C |
| (K) Glucose | (Q) Keratin |
| (L) Water soluble | (R) Essential oils |
| (M) Fibrous Protein | (S) Aldehyde. |
- J-S, K-R, L-Q, M-P
 - J-Q, K-P, L-R, M-S
 - J-R, K-S, L-P, M-Q
 - J-P, K-Q, L-S, M-R
10. The relation between the edge lengths a, b, c in body centered orthorhombic crystal is....
- $a = b = c$
 - $a \neq b \neq c$
 - $a = b \neq c$
 - $a \neq b = c$
11. n - type semiconductor is obtained by adding....
- As
 - Ga
 - Si
 - Bi
12. What is the general formula of ethers?
- $\text{C}_n\text{H}_{2n}\text{O}$
 - $\text{C}_n\text{H}_{2n+2}\text{O}$
 - $\text{C}_n\text{H}_{2n-1}\text{O}$
 - $\text{C}_n\text{H}_{2n-2}\text{O}$
13. 0.1 L of ethylene gas and 0.1 L of hydrogen chloride gas react to form 0.1 L of ethyl chloride gas at 2 atm. The pressure - volume work obtained is....
- 0.2 L.atm
 - 0.03 L.atm
 - 0.03 L.atm
 - 0.2 L.atm

14. Which vitamin deficiency in human blood increase blood clotting time ?
 a) Vitamin P b) Vitamin C
 c) Vitamin A d) Vitamin K
15. The condition for non-spontaneous process is....
 a) $\Delta G = 0$ b) $\Delta G < 0$
 c) $\Delta G > 0$ d) $\Delta G = \Delta H$
16. The functional group present in glucose is
 a) Ketone b) Amine
 c) Aldehyde d) Carboxylic acid
17. The process used for refining nickel and zirconium by vapour phase technique is....
 a) Electrolytic refining
 b) Zone refining
 c) Liquefaction process
 d) Van Arkel Process
18. What are polysomes ?
 a) A cell organelle.
 b) A phosphate based body.
 c) Many ribosomes bound by m-RNA.
 d) A single ribosome bound to t-RNA.
19. Who coined the term 'Genetics' ?
 a) Mendel b) William Bateson
 c) Darwin d) Punnett
20. Which of the following diseases is caused by shortage of red blood cells ?
 a) Meningitis b) Leukemia
 c) Arthritis d) Anemia
21. Insulin is secreted by....
 a) Thyroid b) Pancreas
 c) Pituitary d) None of these
22. With the help of which organ cockroach respire ?
 a) Nasal aperture b) Lungs
 c) Spiracles d) Gills
23. Thrombosis is a disease of the....
 a) Brain b) Skin
 c) Blood d) None of these
24. Filaria is caused by....
 a) Bacteria b) Mosquitoes
 c) Protozoa d) Virus
25. Study of cell....
 a) Cytology b) Entomology
 c) Homoplasy d) Hormonology

MATHEMATICS

26. The negation of $p \wedge \sim (q \wedge r)$ is
 a) $\sim p \wedge (q \vee r)$ b) $\sim p \vee (q \wedge r)$
 c) $\sim p \vee (q \vee r)$ d) $\sim p \vee (\sim q \vee \sim r)$
27. If vectors $a\hat{i} + \hat{j} + \hat{k}, \hat{i} + b\hat{j} + \hat{k}, \hat{i} + \hat{j} + c\hat{k}$ are coplanar then $a + b + c - abc = \dots$
 a) -2 b) -1
 c) 2 d) 1
28. If the distance of the point P(4, 3, 5) from the y-axis is λ , then the value of $7\lambda^2$ is
 a) 287 b) $7\sqrt{41}$
 c) 63 d) 21
29. If $y = \tan^{-1}\left(\frac{ax - b}{bx + a}\right)$ then $\frac{dy}{dx}$ is
 a) $\frac{1}{1+a^2x^2}$ b) $\frac{1}{1+b^2x^2}$
 c) $\frac{1}{1+x^2}$ d) $\frac{-1}{1+x^2}$
30. $\int \frac{\sqrt{\cot x}}{\sin x \cdot \cos x} dx =$
 a) $2\sqrt{\tan x} + c$ b) $-2\sqrt{\tan x} + c$
 c) $2\sqrt{\cot x} + c$ d) $-2\sqrt{\cot x} + c$
31. The order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^{1/6} \left(\frac{dy}{dx}\right)^{1/3} = 5$ are
 a) 3, 1 b) 3, 2
 c) 1, 3 d) 3, 3
32. The general solution of $\cos x = \frac{-1}{2}$ is
 a) $x = 2n\pi \pm \frac{\pi}{3}; n \in \mathbb{Z}$

b) $x = 2n\pi \pm \frac{2\pi}{3}; n \in \mathbb{Z}$

c) $x = 2n\pi \pm \frac{4\pi}{3}; n \in \mathbb{Z}$

d) $x = n\pi \pm \frac{2\pi}{3}; n \in \mathbb{Z}$

33. If \vec{a} and \vec{b} are non-collinear vector, then the value of x for which $\vec{\alpha} = (x - 2)\vec{a} + \vec{b}$ and $\vec{\beta} = (8 + 2x)\vec{a} - 2\vec{b}$ are collinear is

a) $\frac{1}{2}$ b) $-\frac{1}{2}$

c) $\frac{1}{4}$ d) $-\frac{1}{4}$

34. If a line makes angles $\theta_1, \theta_2, \theta_3$ with the co-ordinate planes, then $\sin^2 \theta_1 + \sin^2 \theta_2 + \sin^2 \theta_3 =$

a) 1 b) 2

c) -1 d) -2

35. If $\sin x$ is integrating factor of the differential equation $\frac{dy}{dx} + p_y = \theta$, then the value of P is

a) $\sin x$ b) $\cos x$

c) $\tan x$ d) $\cot x$

36. If the function $f(x) = \frac{\log x - 1}{x - e}$, for $x \neq e$ is continuous at $x = e$ then $f(e)$ is

a) e b) $\frac{1}{e}$

c) 1 d) -1

37. If the function $P(X = x) = k \cdot \frac{2^x}{x!}, x = 1, 2, 3$ is 0 ; otherwise s a PMF of the r.v. X, then the of k is

a) $\frac{1}{19}$ b) $\frac{2}{19}$

c) $\frac{3}{19}$ d) $\frac{4}{19}$

38. Dual statement of $(P \wedge T) \vee (P \wedge \sim q)$

a) $(P \vee T) \wedge (F \vee \sim q)$

b) $(P \vee F) \wedge (T \vee \sim q)$

c) $(\sim P \vee T) \wedge (F \vee q)$

d) $(\sim P \vee F) \wedge (T \vee q)$

39. $\int \frac{dx}{1 + \tan x} = \dots\dots\dots$

a) $\log(x + \sin x) + c$

b) $\log(\sin x + \cos x) + c$

c) $\frac{1}{2}[x - \log(\sin x + \cos x)] + c$

d) $\frac{1}{2}[x + \log(\sin x + \cos x)] + c$

40. The order and degree of differential equation

$\sqrt{1 + \frac{1}{\left(\frac{dy}{dx}\right)^2}} = \left(\frac{d^2y}{dx^2}\right)^{3/2}$ are respectively.

a) 2, 1 b) 2, 2

c) 3, 2 d) 2, 3

41. $y = \sec^{-1}\left(\frac{\sqrt{x} + 1}{\sqrt{x} - 1}\right) + \sin^{-1}\left(\frac{\sqrt{x} - 1}{\sqrt{x} + 1}\right)$ then $\frac{dy}{dx}$ is

a) 0 b) 1

c) x d) -1

42. If the slopes of the lines represented by $x^2 + 2hxy + 2y^2 = 0$ are in the ratio 1 : 2 then the value of h is

a) $\pm \frac{1}{2}$ b) $\pm \frac{3}{2}$

c) -3 d) ± 3 .

43. $\int \cos^2 x \sin^2 x \, dx$ is

a) $\frac{1}{8} \left(x - \frac{\sin 4x}{4} \right) + c$

b) $\frac{1}{4} \left(x - \frac{\sin 4x}{4} \right) + c$

c) $\sec^2 x + c$

d) $\tan x + c$

44. If x is a random variable with probability mass function $P(X = x) = kx, x = 1, 2, 3, 4, 5$ = 0 , otherwise

a) $\frac{1}{13}$ b) $\frac{1}{3}$

c) $\frac{1}{14}$ d) $\frac{1}{15}$

45. The contrapositive of the inverse of the statement 'If two numbers are not equal, then their squares are not equal' is

a) If the squares of two numbers are not equal, then numbers are not equal.

- b) If two numbers are equal, then their squares are equal.
- c) If the squares of two numbers are equal, then the numbers are equal.
- d) If the squares of two numbers are not equal, then numbers are equal.

46. If $X \sim B(6, P)$ and $2.P(X = 3) = P(X = 2)$ then the value of P is

- a) $\frac{2}{11}$ b) $\frac{3}{11}$
- c) $\frac{5}{11}$ d) $\frac{4}{11}$

47. The angle between the lines $\vec{r} = (4\hat{i} + 7\hat{j} - 4\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 2\hat{k})$ and $\vec{r} = (5\hat{i} - 4\hat{j} + 3\hat{k}) + \mu(3\hat{i} + 2\hat{j} + 6\hat{k})$ is

- a) $\cos^{-1}\left(\frac{1}{21}\right)$ b) $\cos^{-1}\frac{19}{2}$
- c) $\frac{\pi}{2}$ d) $\cos^{-1}\left(\frac{9}{21}\right)$

48. If $f(x) = |\cos x|$, then $f'\left(\frac{3\pi}{4}\right) = \dots$

- a) $\frac{-1}{\sqrt{2}}$ b) $\frac{1}{\sqrt{2}}$
- c) 1 d) $\frac{1}{2}$

49. $\int \frac{1}{\sqrt{1 + \sin x}} dx =$

- a) $\log \left| \tan\left(\frac{x}{4} + \frac{\pi}{8}\right) \right| + c$
- b) $\sqrt{2} \log \left| \tan\left(\frac{x}{4} + \frac{\pi}{8}\right) \right| + c$
- c) $2 \log \left| \tan\left(\frac{x}{4} + \frac{\pi}{8}\right) \right| + c$
- d) $\frac{1}{\sqrt{2}} \log \left| \tan\left(\frac{x}{4} + \frac{\pi}{8}\right) \right| + c$

50. The value of

$$\frac{\vec{a} \cdot (\vec{b} \times \vec{c})}{\vec{b} \cdot (\vec{c} \times \vec{a})} + \frac{\vec{b} \cdot (\vec{c} \times \vec{a})}{\vec{c} \cdot (\vec{a} \times \vec{b})} + \frac{\vec{c} \cdot (\vec{a} \times \vec{b})}{\vec{a} \cdot (\vec{b} \times \vec{c})}$$
 is

- a) 0 b) 1
- c) 2 d) 3

ENGLISH

Directions (Q . No, 51 to 53) Out of the four alternatives select the correct options which will substitute the underline

51. Happening by chance.

- a) Usual b) Campaign
- c) Casual d) Adversary

52. Coining a new word.

- a) Nepotism b) Oligarchy
- c) Plutocracy d) Neologism

53. Something full of words.

- a) Verbose b) Verbal
- c) Non-verbal d) Wardrobe

Directions (Q. No, 54 to 57) Out of the four options given one option is wrongly spelt. Find the wrongly spelt word.

- 54. a) Calorie b) Calligraphy
- c) Calumny d) Celibrate
- 55. a) Fiesible b) Feature
- c) Favor d) Fiery
- 56. a) Apostle b) Aperture
- c) Rummage d) Pilgrimage

- 57. a) Grimy b) Grievous
- c) Apraise d) Apathy

Directions (Q. 58 to 60) Fill in the blanks with the meaning full word

58. Raghul was only 10 years old when his parents moved out their big old house to smaller one.

- a) Of b) From
- c) In d) Through

59. Raghul was alone in it.

- a) Sometimes b) Soon
- c) Never d) Completely

60. Raghul was not and blamed his parent for this.

- a) Aggrieved b) Saddened
- c) Blamed d) Answer

Directions (Q. 61 to 63) In the following questions some part of the sentences have errors and some are correct. Find out which part of a sentence has an error. The number of that part is the answer. If a sentence is free from error then your answer is (d) i.e, no error

61. a) I often wonder to whom is it/
 b) A nation over's /
 c) Its greatest debt of gratitude/
 d) No error
62. You and I (a) / am going to take part (b) / In the meeting tomorrow (c) / No error (d).
63. When the students reached late (a) / the teacher objected their entering the class (b) / without his permission (c) / No error (d).

Directions (Q. 64 to 66) Select the Synonyms

64. Mundane
 a) Spiritual b) Worldly
 c) Universal d) Instance
65. Prerogative
 a) Privilege b) Derive
 c) Oppose d) Request
66. Select the antonym for original.
 a) Erroneous b) Duplicate
 c) Fault d) Exact

Directions (Q. 67 to 68) Fill in the blanks with proper meaningful sentence.

67. Nobody can me to do anything which I do not want to do.
 a) Encourage
 b) Request
 c) Oppose
 d) Compel
68. All the employees in the company are entitled reimbursement of medical expenses.
 a) Of b) For
 c) To d) With

Directions (Q. 69 to 70) Find the meaning of indian or phrases from the given options.

69. To blow one's own trumpet.
 a) To praise one's own good deeds.
 b) To blow trumpet
 c) To play music
 d) To work hard for self.
70. To go to dogs.
 a) To help
 b) To urge
 c) Become ruined
 d) become hardworking

Directions (Q. 71 to 75) Read the passage and select the correct options below

Bansilal's train was late and it reached Mumbai a little after midnight. It was his first visit to the city, and he didn't knew where to go. He though he would go to the choultry where he would not have to pay the rent, but he did not know where to find one at that hour. He asked the porter to get him a cheap room. The porter said that if Bansilal gave him three rupees, he would take him to one. But Bansilal waved him away and the walked out of the station. He wandered through the streets and asked a number of people but could not find a room cheap enough for him. He sat down on a park bench to think of what he should do next. He was very tired and felt asleep on the bench. He woke up in the morning Stiff in every limb - but he smiled where he realised that it was the cheapest hotel he had ever been to.

71. Bansilal cannot get any accommodation for the night because....
 a) All the hotels in the city were closed.
 b) All the hotels rooms were booked.
 c) The hotels were too expensive for him to afford.
 d) He wanted to spend the night in open.
72. In the passage the words 'Choultry' means....
 a) An expensive hotel
 b) A highway motel
 c) A roadside eating shop
 d) A free resting place.
73. The porter refused to help Bansilal because....
 a) He was rude to the porter
 b) He has no previous acquaintance with porter
 c) He spoke language which porter could not understand
 d) He refused to pay porter any tips.
74. The night long stay in the open....
 a) Refreshed Bansilal
 b) Gave him aches all over his body
 c) Made his limbs stronger
 d) Did not affect him at all.
75. Bansilal appears as....
 a) A thrifty person
 b) An extravagant spender
 c) An advantage seeking person
 d) A fun - loving person.

GENERAL AWARENESS

76. How many 7's are there in the following series which are preceded by 8 and NOT immediately followed by 3 ?
898762263269732872778737794
- a) 4 b) 3
c) 2 d) 8
77. If + means -, - means X, X means /, / means + then $15 \times 3 / 15 + 5 - 2 = ?$
- a) 0 b) 6
c) 10 d) 20
(e) None of these
78. Find the missing number
2A11, 4D13, 12G17, ?
- a) 48J23 b) 26J23
c) 24J21 d) 48K23
(e) None of these
79. Find odd man out.
- a) BCD b) NPQ
c) KCM d) RQP
(e) HGF
80. If $11 \times 12 \times 13 = 234$ then $31 \times 43 \times 54 = ?$
- a) 479 b) 489
c) 379 d) 497
(e) Not
81. Our constitution was adopted on....
- a) 26th November 1949
b) 15th August 1945
c) 26th January 1950
d) 15th August 1947.
82. The Attorney general of India is appointed by
- a) Chief Justice of India
b) The President
c) The Vice president
d) Prime Minister
83. Money bill must be introduced in
- a) Lok sabha only
b) Rajya Sabha only
c) Either of these two
d) None of these.
84. Which article deals with ammendment of constitution ?
- a) 356 b) 368
c) 372 d) 370
85. The salary of the president is taken from
- a) Consolidated fund
b) Contingency fund
c) Prime minister's fund
d) None of these.
86. Mohenjodaro & Harappa are in....
- a) India b) Pakistan
c) Afghanistan d) Bangladesh
87. Ashoka conquered Kalinga in the year....
- a) 261 BC b) 74 AD
c) 327 BC d) 147 AD
88. The Gandhi - Irwin Pact was signed in the year....
- a) 1930 b) 1931
c) 1925 d) 1940
89. The civil services in India was established by....
- a) Lord Ripon b) Lord Dalhousie
c) Lord Canning d) Lord Cornwallis
90. The first university in India was founded at....
- a) Madras b) Bombay
c) Delhi d) Calcutta
91. Lunar eclipse occurs when....
- a) Earth is between the sun and the moon
b) Moon is between the sun and the earth
c) Sun is between the earth and the moon
d) None of these.
92. Kaziranga sanctuary is in....
- a) Madhya Pradesh
b) Assam
c) Bihar
d) Uttar Pradesh
93. Silver is found in
- a) Karnataka b) Madhya Pradesh
c) Bihar d) Rajasthan
94. Capital of Croatia....
- a) Tehran b) Minsk
c) Zagreb d) Abuja
95. Land of while elephant is....
- a) Thailand b) Australia
c) Japan d) China
96. Which state government has launched 'Major Dhyanchand Vijaypath Yojana' ?
- a) Bihar

- b) Uttar Pradesh
- c) Madhya Pradesh
- d) Odisha

97. In which state onam is celebrated as the annual harvest festival....

- a) Tamil Nadu b) Karnataka
- c) Andra Pradesh d) Kerala

98. Who has become first bowler to take 500 wickets in T20 cricket.

- a) Dwayne Bravo b) Trent bourt
- c) Pat cummins d) James anderson

99. Who won 2019 Ramon magsaysay award ?

- a) Sudhir Chaudhary b) Ravish Kumar
- c) Arnab Goswami d) Anjana Om Kashyap

100. From which year, world's longest bus voyage from Delhi to London will start.

- a) 2020 b) 2021
- c) 2022 d) 2023.



1. a)	21. b)	41. a)	61. a)	81. a)
2. d)	22. c)	42. b)	62. b)	82. b)
3. d)	23. c)	43. a)	63. b)	83. a)
4. d)	24. b)	44. d)	64. a)	84. b)
5. d)	25. a)	45. a)	65. a)	85. a)
6. d)	26. b)	46. b)	66. b)	86. b)
7. d)	27. c)	47. b)	67. d)	87. a)
8. b)	28. a)	48. b)	68. c)	88. b)
9. c)	29. c)	49. b)	69. a)	89. d)
10. b)	30. d)	50. d)	70. c)	90. d)
11. a)	31. a)	51. c)	71. c)	91. b)
12. b)	32. b)	52. d)	72. d)	92. b)
13. d)	33. c)	53. a)	73. d)	93. d)
14. d)	34. a)	54. d)	74. b)	94. c)
15. c)	35. d)	55. a)	75. a)	95. a)
16. c)	36. b)	56. d)	76. c)	96. b)
17. d)	37. c)	57. c)	77. c)	97. d)
18. c)	38. b)	58. b)	78. a)	98. a)
19. b)	39. d)	59. d)	79. b)	99. b)
20. d)	40. d)	60. a)	80. a)	100. b)

