

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

PRELIMINARY SCREENING  
TEST BOOKLET

TEST BOOKLET SERIES

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

Full marks : 100

Answer *all* the questions.

Questions are of equal value.

Serial No. ....4878....

Roll No.: Signature of the Candidate: 

## INSTRUCTIONS

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

1. This booklet consists of 16 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 are blank pages 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. Lalit Kala Academy is associated with the field of

- (A) Dance
- (B) Literature
- (C) Drama
- (D) Art

2. Distance between the lines  $5x+3y-7=0$  and  $15x+9y+14=0$  is

- (A)  $\frac{35}{\sqrt{34}}$
- (B)  $\frac{1}{3\sqrt{34}}$
- (C)  $\frac{35}{3\sqrt{34}}$
- (D)  $\frac{35}{2\sqrt{34}}$

3. Select the most appropriate antonym of 'Zenith'.

- (A) Apex
- (B) Nadir
- (C) Ferocious
- (D) Flagrant

4. The order and degree of the differential

equation  $\frac{d^2y}{dx^2} + \sqrt{\left(\frac{dy}{dx}\right)^3} - y = 0$  are respectively

- (A) 1, 2
- (B) 2, 1
- (C) 2, 2
- (D) 1, 1

5. Let A be a  $3 \times 3$  matrix with  $\det A = 4$ . Then,  $\det (3A)$  is equal to

- (A) 108
- (B) 12
- (C) 36
- (D) 192

6. If the standard deviation of  $1, 2, 3, \dots, n$  is  $\sqrt{14}$ , then the value of  $n$  is

- (A) 13
- (B) 8
- (C) 15
- (D) 27

7. Let  $E_n$  and  $J_n$  denote the total energy and the angular momentum of an electron in the  $n^{\text{th}}$  allowed orbit of a Bohr atom. Then,

- (A)  $E_n \propto J_n$
- (B)  $E_n \propto \frac{1}{J_n}$
- (C)  $E_n \propto J_n^2$
- (D)  $E_n \propto \frac{1}{J_n^2}$

8. If  $y = \tan^{-1}\left(\frac{\cos x}{1 + \sin x}\right)$ , then  $\frac{dy}{dx}$  is equal to

- (A)  $\frac{1}{2}$
- (B) 2
- (C) -2
- (D)  $-\frac{1}{2}$

9. Angle of prism is  $A$  and its one surface is silvered. Light rays falling at an angle of incidence  $2A$  on first surface return back through the same path after suffering reflection at the second silvered surface. The refractive index of the material is

- (A)  $2\sin A$   
 (B)  $2\cos A$   
 (C)  $\frac{\cos A}{2}$   
 (D)  $\tan A$

10. The Apparent coefficient of expansion of a liquid when heated in a copper vessel is  $C$  and when heated in a silver vessel is  $S$ . If  $A$  is the linear coefficient of expansion of copper, then the linear coefficient of expansion of silver is

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

11. If  $1, \omega_1, \omega_2, \dots, \omega_{n-1}$  are the  $n$ th roots of unity, then the value of  $(1-\omega_1)(1-\omega_2)\dots(1-\omega_{n-1})$  is

- (A) 1  
 (B)  $2n$   
 (C)  $n$   
 (D) 0

12. Provide a synonym for the word 'Abortive'

- (A) Productive  
 (B) Accomplished  
 (C) In vain  
 (D) Absolving

13. On which of the following Indian river is the Sardar Sarovar Project located?

- (A) Betwa  
 (B) Chambal  
 (C) Mahi  
 (D) Narmada

14. The distance of the point  $P(a, b, c)$  from  $x$ -axis is

- (A)  $\sqrt{b^2 + c^2}$   
 (B)  $\sqrt{a^2 + b^2}$   
 (C)  $\sqrt{a^2 + c^2}$   
 (D) None of the above

15. In a circuit,  $L, C$  and  $R$  are connected in series with an alternating voltage source of frequency  $f$ . The current leads the voltage by 45 degrees. The value of  $C$  is

- (A)  $\frac{1}{\pi f(2fL - R)}$   
 (B)  $\frac{1}{2\pi f(2fL - R)}$   
 (C)  $\frac{1}{\pi f(2fL + R)}$   
 (D)  $\frac{1}{2\pi f(2fL + R)}$

16. A bomb at rest disintegrates into three pieces. Two pieces, each with one-fourth of the mass of the bomb fly off in mutually perpendicular directions with speeds  $3 \text{ ms}^{-1}$  and  $4 \text{ ms}^{-1}$ . The speed of the other fragment would then be

- (A)  $2.5 \text{ ms}^{-1}$   
 (B)  $1.0 \text{ ms}^{-1}$   
 (C)  $2.0 \text{ ms}^{-1}$   
 (D)  $1.5 \text{ ms}^{-1}$

Please Turn Over

17. Let A and B two non-empty sets having  $n$  elements in common. Then the number of elements common to  $A \times B$  and  $B \times A$  is

- (A)  $2n$
- (B)  $n$
- (C)  $n^2$
- (D) None of the above

18. Fill in with appropriate preposition:

The programme was conducted \_\_\_\_\_  
the auspices of the local committee.

- (A) by
- (B) for
- (C) in
- (D) under

19. During whose regime Shri Chaitanya preached Vaisnavism in Bengal and Orissa?

- (A) Pala Dynasty
- (B) Sena Dynasty
- (C) Hussain Shahi Dynasty
- (D) Karrani Dynasty

20. He is able to use his left hand and right hand with equal ease. He is \_\_\_\_\_.

- (A) Misogynistic
- (B) Ambidextrous
- (C) Epicurean
- (D) Pluralistic

21. The electric field on a point on a line passing through the centre of the dipole and perpendicular to the line joining the two charges varies with the distance ' $r$ ' from the center of the dipole as

- (A)  $\frac{1}{r}$
- (B)  $\frac{1}{r^2}$
- (C)  $\frac{1}{r^3}$
- (D)  $\frac{1}{r^{\frac{3}{2}}}$

22.  $\lim_{x \rightarrow 2} \frac{\sin^{-1}(x-2)}{x^2-4}$  is equal to

- (A) 0
- (B) 2
- (C)  $\frac{1}{4}$
- (D) 1

23. Equation of the plane through the point (1,2,3) parallel to the plane  $x+2y+3z+5=0$  is

- (A)  $x+2y+3z=14$
- (B)  $2x+y+3z=12$
- (C)  $x-2y-3z=11$
- (D)  $5x+10y+3z=15$

24. If  $x=a+b$ ,  $y=a\omega+b\omega^2$ ,  $z=a\omega^2+b\omega$ , where  $\omega$  is a complex root of unity, then  $xyz$  is equal to

- (A)  $a^3+b^3$
- (B)  $a^3+b^3-3ab$
- (C)  $a^2+b^2$
- (D)  $a^2+b^2-6ab$

25. What is the difference between solar cell and photodiode?

- (A) No external bias in solar cell
- (B) No external bias in photodiode
- (C) Larger surface area in photodiode
- (D) No essential difference

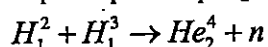
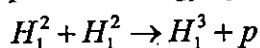
26. Fifty divisions on the vernier scale coincides with forty-nine divisions on the main scale of a vernier caliper. The least count of the instrument, if graduation on the main scale is 2mm is

- (A)  $\frac{1}{25}$  mm  
 (B)  $\frac{1}{50}$  mm  
 (C)  $\frac{3}{49}$  mm  
 (D)  $\frac{1}{49}$  mm

27. Twenty seven identical drops of mercury are charged to the same potential of 10 units. Assuming the drops are made to combine to form one large drop, then its potential is

- (A) 45 units  
 (B) 135 units  
 (C) 270 units  
 (D) 90 units

28. A star initially has a supply of  $10^{40}$  Deuterons. It produces energy by the processes:



If the average power radiated by the star is  $10^{16}$  W, the Deuteron supply of the star is exhausted in a time of the order of

- (A)  $10^6$  sec  
 (B)  $10^8$  sec  
 (C)  $10^{12}$  sec  
 (D)  $10^{16}$  sec

29. Identify which part of the given sentence has an error:

You need to practice more and more in order to become perfect.

- (A) need  
 (B) practice  
 (C) more and more  
 (D) in order to

30. Let A be a set of 4 elements and B be a set of 3 elements. Then the total number of surjective mapping from A to B is

- (A) 72  
 (B) 36  
 (C) 12  
 (D) 144

31. Provide a word closest in meaning to 'Boisterous'

- (A) Placid  
 (B) Clamorous  
 (C) Devious  
 (D) Insensitive

32. Optical Fibre is based on

- (A) Total internal reflection  
 (B) Less Scattering  
 (C) Refraction  
 (D) Less Absorption Coefficient

33. A galvanometer of resistance  $200 \Omega$  gives a full scale deflection for current of 15 milliamps. To convert it into a 15 volt range voltmeter, what resistance should be connected in series with it ?

- (A)  $800 \Omega$   
 (B)  $1000 \Omega$   
 (C)  $1500 \Omega$   
 (D)  $2500 \Omega$

Please Turn Over

34. If two waves of the same frequency and amplitude produce respectively on superposition, a resultant disturbance of the same amplitude the waves differ in phases by

- (A)  $\pi$
- (B)  $\frac{2\pi}{3}$
- (C)  $\frac{\pi}{3}$
- (D)  $3\pi$

35. Select the most appropriate antonym of 'Garrulous'.

- (A) Taciturn
- (B) Garrison
- (C) Efflorescent
- (D) Empowered

36. It is possible to throw a particle with a given speed in two different ways so as to make it pass through a point at a horizontal distance of  $r$  from the point of projection. The product of the times taken to reach this point corresponding to the two different ways of projection is then proportional to

- (A)  $r$
- (B)  $r^2$
- (C)  $\frac{1}{r}$
- (D)  $\frac{1}{r^2}$

37. The number of solutions of the equation  $z^2 + \bar{z} = 0$  is

- (A) one
- (B) two
- (C) three
- (D) four

38. Three unbiased coin is tossed. Then the probability of at least one is head is

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

39. One Horse Power is equal to

- (A) 745 watts
- (B) 750 watts
- (C) 746 watts
- (D) 764 watts

40. In which of the following languages was the weekly Banga-Duta published from Calcutta in 1822?

- (A) English
- (B) Bengali
- (C) Persian
- (D) All of the above

41. What is the semiconductor diode used for?

- (A) Oscillator
- (B) Amplifier
- (C) Rectifier
- (D) Modulator

42. Identify the tense in the sentence:

I have been coming here since I was a child.

- (A) Present continuous
- (B) Present perfect
- (C) Present perfect continuous
- (D) Simple present

43. A copper block of mass 2 kg is heated to a temperature of 500 degree centigrade and then placed in a large block of ice at 0 degree centigrade. What is the maximum amount of ice that can melt? [Specific heat of copper:  $400 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$  and latent heat of fusion of water is  $3.5 \times 10^5 \text{ J kg}^{-1}$ .]

- (A)  $\frac{4}{3} \text{ kg}$   
 (B)  $\frac{6}{5} \text{ kg}$   
 (C)  $\frac{8}{7} \text{ kg}$   
 (D)  $\frac{10}{9} \text{ kg}$

44. Identify the word with the correct spelling:

- (A) Repetition  
 (B) Repitition  
 (C) Repeatation  
 (D) Repeation

45. If  $a^x = b^y = c^z$  and  $a, b, c$  are in G.P, then  $x, y, z$  will be in

- (A) A.P  
 (B) G.P  
 (C) H.P  
 (D) None of the above

46. Fill in the blank:

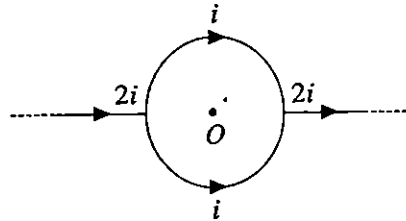
Gandhi \_\_\_\_\_ his followers to observe non-violence.

- (A) enjoined  
 (B) rejoined  
 (C) conjoined  
 (D) disjoined

47. Let S be a set of  $n$  elements then the number of symmetric relations defined on S is

- (A)  $2^{n^2-1}$   
 (B)  $2^{n^2-n}$   
 (C)  $2^{\frac{n(n-1)}{2}}$   
 (D)  $2^{\frac{n(n+1)}{2}}$

48. An infinite straight conductor carrying current  $2i$  is split into a loop of radius ' $r$ ' as shown in fig. The Magnetic field at the center of the coil is



- (A)  $\frac{\mu_0}{4\pi} \frac{2(\pi+1)}{r}$   
 (B)  $\frac{\mu_0}{4\pi} \frac{2(\pi-1)}{r}$   
 (C)  $\frac{\mu_0}{4\pi} \frac{(\pi+1)}{r}$   
 (D) Zero

49. Let  $f(x) = \begin{cases} x^2 - 2x & \text{for } x \neq 0 \\ k & \text{for } x = 0 \end{cases}$

If  $f$  is continuous at  $x = 0$ , then  $k$  is

- (A) -1  
 (B) -2  
 (C) 0  
 (D)  $\frac{1}{2}$

50. Let  $D_1 = \begin{vmatrix} a & b & c \\ x & y & z \\ p & q & r \end{vmatrix}$ ,  $D_2 = \begin{vmatrix} -x & a & -p \\ y & -b & q \\ z & -c & r \end{vmatrix}$ , then

- (A)  $D_1 = D_2$   
 (B)  $D_1 = 2D_2$   
 (C)  $D_1 = -D_2$   
 (D)  $2D_1 = D_2$

51. If  $[1 \ x \ 1] \begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix} \begin{bmatrix} x \\ 1 \\ -2 \end{bmatrix} = O$ , where  $O$  is

the zero matrix, then the value of  $x$  is

- (A) 0  
 (B)  $\frac{2}{3}$   
 (C)  $\frac{5}{4}$   
 (D)  $-\frac{4}{5}$

52. Identify which part of the given sentence has an error:

I am the sort of person who like peace and quiet.

- (A) I am  
 (B) the sort of person  
 (C) who like  
 (D) peace and quiet

53. The area of the region bounded by the ellipse  $\frac{x^2}{9} + \frac{y^2}{4} = 1$  in the fourth quadrant is

- (A)  $\frac{3\pi}{4}$  square units  
 (B)  $\frac{3\pi}{2}$  square units  
 (C)  $\frac{5\pi}{2}$  square units  
 (D)  $\frac{5\pi}{3}$  square units

54. Which of the following words is singular in number?

- (A) Indices  
 (B) Bacteria  
 (C) Larva  
 (D) Axes

55. Radiation of two photon energies, twice and five times the work function of a certain photoelectric material are incident successively on the surface of the metal. The ratio of the maximum velocity of the photoelectrons emitted in the two cases will be

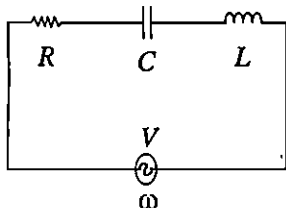
- (A) 1 : 1  
 (B) 1 : 2  
 (C) 1 : 3  
 (D) 1 : 4

56. The ratio of specific heats of Helium and Hydrogen gas is

- (A) 1 : 2  
 (B) 3 : 5  
 (C) 5 : 7  
 (D) 1 : 3



57. In the circuit of fig., the current flowing through the resistance  $R$  at resonance is



- (A) Zero  
 (B)  $\frac{V}{R}$   
 (C)  $\frac{V}{\sqrt{R^2 + \omega^2 L^2}}$   
 (D)  $\frac{V}{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$

58. Identify the word with the correct spelling:

- (A) Embarasment  
 (B) Embarassment  
 (C) Embarrasment  
 (D) Embarrassment

59. The temperature of the sink of a carnot engine is 27 degree centigrade. If the efficiency of the engine is 25%, the temperature of the source is

- (A) 227 °C  
 (B) 327 °C  
 (C) 127 °C  
 (D) 27 °C

60. If  $x = a(\theta - \sin \theta)$  and  $y = a(1 - \cos \theta)$ , then  $\frac{d^2 y}{dx^2}$  is

- (A)  $-\frac{1}{a \sin^2 \frac{\theta}{2}}$   
 (B)  $-\frac{1}{4a} \operatorname{cosec}^2 \frac{\theta}{2}$   
 (C)  $-\frac{1}{4a} \sec^2 \frac{\theta}{2} \operatorname{cosec}^2 \frac{\theta}{2}$   
 (D) None of the above

61. For two events A and B,  $P(B) = \frac{1}{4}$ ,  $P(A/B) = \frac{1}{3}$  and  $P(B/A) = \frac{1}{4}$ , then P (A) is

- (A)  $\frac{1}{12}$   
 (B)  $\frac{1}{3}$   
 (C)  $\frac{1}{2}$   
 (D)  $\frac{1}{6}$

62. The differential equation by eliminating arbitrary constant  $a$  and  $b$  from the relation  $x = a \cos t + b \sin t$  is

- (A)  $\frac{d^2 x}{dt^2} + x = t$   
 (B)  $\frac{d^2 x}{dt^2} + x = 0$   
 (C)  $\frac{d^2 x}{dt^2} - \frac{dx}{dt} = 0$   
 (D)  $\frac{d^2 x}{dt^2} + t \frac{dx}{dt} = 0$

63. The distance of a point particle (measured in meters) from an assumed origin varies with time  $t$  (measured in seconds) as  $x(t) = at + bt^2$ . Find the average velocity of the particle between one and five seconds:

- (A)  $4b$
- (B)  $a + 5b$
- (C)  $\frac{1}{2}(a+b)$
- (D)  $a + 6b$

64. Which Article of the Indian Constitution mentions about the National Commission for Schedule Caste (SC) and Schedule Tribe (ST)?

- (A) Article 326
- (B) Article 338
- (C) Article 340
- (D) Article 343

65. Conductors, semiconductors and insulators differ from each other due to the properties related to

- (A) current conducting capacity
- (B) formation of crystal lattice
- (C) binding energy of the electrons
- (D) mutual width of their energy gaps

66. "No strings attached" means

- (A) Without any preconditions
- (B) Loose
- (C) Disoriented
- (D) Deeply religious

67. If  ${}^5P_r = 2{}^6P_{r-1}$ , then the value of  $r$  is

- (A) 10
- (B) 3
- (C) 0
- (D) None of the above

68. If  $a, b, c$  are positive real numbers and not all equal, then the least value of,

$$\frac{S}{S-a} + \frac{S}{S-b} + \frac{S}{S-c} \text{ where } 2S = a+b+c \text{ is}$$

- (A) 18
- (B) 9
- (C) 6
- (D) 12

69. In which year was the Earth Summit held?

- (A) 1991
- (B) 1992
- (C) 1993
- (D) 1994

70. Fill in the blank:

He \_\_\_\_\_ the rope that bound my wrists.

- (A) losed
- (B) loosened
- (C) losened
- (D) loosed

71. She believes that one should dedicate oneself to the pursuit of pleasure alone. She is a \_\_\_\_\_.

- (A) Hedonist
- (B) Nihilist
- (C) Somnambulist
- (D) Pacifist

72. Which among the following Act introduced the idea of Federalism in India?

- (A) Government of India Act, 1909
- (B) Government of India Act, 1919
- (C) Government of India Act, 1935
- (D) Indian Independence Act, 1947

73. A battery with internal resistance ' $r$ ' supplies current to a load resistance ' $R$ '. Maximum power would be transferred to the load when

- (A)  $R \gg r$
- (B)  $R \sim r$
- (C)  $R \ll r$
- (D)  $R = r/2$

74. Who among the following regarded the Right to Constitutional Remedies as the "Heart and Soul of the Constitution"?

- (A) B. N. Rau
- (B) Dr. B. R. Ambedkar
- (C) Jawaharlal Nehru
- (D) Dr. K. M. Munshi

75. If the sum of a certain  $n$  number of terms of the A.P, 25, 22, 19, ... is 116, then the last term is

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

76. Identify the tense in the sentence:

By next week I shall have completed the project.

- (A) Simple future
- (B) Future perfect
- (C) Future continuous
- (D) Future perfect continuous

77. The dimensional formula for electric flux is

- (A)  $M^{-1} L^{-3} T^2 Q^2$
- (B)  $ML^3 T^{-2} Q^{-1}$
- (C)  $MLT^{-2} Q^{-1}$
- (D)  $ML^2 T^{-2} Q^{-1}$

78. The circles  $x^2+y^2-6x-8y = 0$  and  $x^2+y^2-6x+8 = 0$  are

- (A) intersecting in two points
- (B) non-intersecting
- (C) touching externally
- (D) touching internally

79. An electron of mass  $m$  when accelerated through a potential  $V$  has a de-Broglie wavelength  $\lambda$ . The de-Broglie wavelength of a particle of mass  $M$  accelerated through the same potential difference will be

- (A)  $\lambda \sqrt{\frac{M}{m}}$
- (B)  $\lambda \sqrt{\frac{m}{M}}$
- (C)  $\lambda \frac{M}{m}$
- (D)  $\lambda \frac{m}{M}$

80. A lens behaves as a converging lens in air but as a diverging lens in water (refractive index 1.33). The refractive index of the material  $\mu$  is

- (A)  $\mu = 1$
- (B)  $\mu = 1.33$
- (C)  $1 < \mu < 1.33$
- (D)  $\mu > 1.33$

81. If  $|\vec{a}| = 5$ ,  $|\vec{b}| = 2$  and  $|\vec{a} \times \vec{b}| = 6$ , then  $\vec{a} \cdot \vec{b}$  is equal to

- (A) 0
- (B)  $\frac{4}{5}$
- (C)  $\frac{3}{5}$
- (D) 8

82. If  $y^\alpha$  is an integrating factor of the differential equation  $2xy \, dx - (3x^2 - y^2) \, dy = 0$ , then the value of  $\alpha$  is

- (A) -4
- (B) 4
- (C) -1
- (D) 1

83. A fixed mass of gas at a pressure of one atmosphere ( $\gamma = 1.4$ ) is compressed adiabatically to 5 atmospheres and then allowed to expand isothermally to its original volume, the pressure at the end of the isothermal process would be

- (A) 1 atmosphere
- (B) 5 atmosphere
- (C) 1.58 atmosphere
- (D) 6.4 atmosphere

84. The function  $x^x$  is increasing, when

- (A)  $x > \frac{1}{e}$
- (B)  $x < \frac{1}{e}$
- (C)  $x < 0$
- (D) for all real  $x$

85. Two slabs A and B are placed one over another such that their surfaces are completely in contact. The thickness of slab A is twice that of B. The first surface of the slab A is maintained at  $100^\circ\text{C}$  while the second surface is maintained at  $25^\circ\text{C}$ . The temperature at the contact of their surfaces is

- (A)  $75^\circ\text{C}$
- (B)  $45^\circ\text{C}$
- (C)  $62.5^\circ\text{C}$
- (D)  $55^\circ\text{C}$

86. The value of  $\int_0^1 \frac{\log(1+x)}{1+x^2} \, dx$  is

- (A)  $\pi \log 2$
- (B)  $\frac{\pi}{4} \log 2$
- (C)  $\frac{\pi}{8} \log 2$
- (D)  $\frac{\pi}{2} \log 2$

87. A magnetic field of induction  $B = 35.34 \times 10^{-6} \, \text{T}$  is applied on an electron in a direction perpendicular to its motion. The time required by the electron to complete one revolution is

- (A)  $1 \, \mu\text{s}$
- (B)  $2 \, \mu\text{s}$
- (C)  $0.5 \, \mu\text{s}$
- (D)  $1.5 \, \mu\text{s}$

88. Add a suitable prefix to form the opposite of the word 'Permeable'.

- (A) Unpermeable
- (B) Dispermeable
- (C) Impermeable
- (D) Impermeable

89. A block of mass  $M$  is attached to a horizontal spring of force constant  $k$  fixed to one side of a rigid support. When the mass is in equilibrium position, another small mass  $m$  is gently placed on it. The new time period of oscillation is

(A)  $2\pi\sqrt{\frac{M+m}{k}}$

(B)  $2\pi\sqrt{\frac{M-m}{k}}$

(C)  $\sqrt{\frac{M+m}{2k}}$

(D)  $\sqrt{\frac{M-m}{2k}}$

90. Fill in with appropriate preposition:

The Supreme Court yesterday issued an order setting \_\_\_\_\_ the judgment of the High Court.

- (A) apart  
(B) about  
(C) aside  
(D) off

91. A problem in Mathematics is given to three students A, B and C. The chances of solving the

problem by A, B and C are  $\frac{1}{3}$ ,  $\frac{1}{4}$  and  $\frac{1}{5}$  respectively.

The probability that the problem will be solved is

(A)  $\frac{2}{5}$

(B)  $\frac{3}{5}$

(C)  $\frac{1}{60}$

(D)  $\frac{47}{60}$

92. A charge ' $q$ ' is placed at the centre of a line joining two equal charges ' $Q$ '. The system of charges will be in equilibrium if

(A)  $q = -\frac{Q}{2}$

(B)  $q = -\frac{Q}{4}$  (C)

(C)  $q = -4Q$

(D)  $q = \frac{Q}{2}$

93. A cylindrical copper rod is stretched to twice its original length with no change in its volume. The resistance between its end before the change was  $R$ . Now its resistance will be

- (A)  $8R$   
(B)  $6R$   
(C)  $4R$  (C)  
(D)  $2R$

94. "To spill the beans" means

- (A) To be clumsy  
(B) To reveal a secret  
(C) To be a glutton  
(D) To be unkind

95. If  $AB = A$  and  $BA = B$ , where A and B are square matrices of the same order, then  $B^2$  is equal to

- (A) B  
(B) A  
(C)  $-B$   
(D)  $B^3$

96. The wavelength of sodium light is 589 nm in air. What would be the wavelength of sodium light if it travels in glass of refractive index 1.5?

- (A) 589 nm  
(B) 884 nm  
(C) 393 nm  
(D) None of the above

Please Turn Over

97. The eccentricity of the hyperbola with latus rectum 12 and semi-conjugate axis  $2\sqrt{3}$  is

- (A) 3
- (B)  $\sqrt{\frac{3}{2}}$
- (C)  $2\sqrt{3}$
- (D) 2

98. In a double star system comprising of two stars (one of mass  $m$  and another of mass  $2m$ ) separated by a distance of  $d$  rotate about their common center of mass. The ratio of angular momentum of the inner star to that of the outer star is

- (A)  $\frac{1}{3}$
- (B)  $\frac{2}{3}$
- (C)  $\frac{3}{2}$
- (D)  $\frac{1}{2}$

99. If  $A$  is a square matrix and  $A^T$  is its transpose then  $\frac{1}{2}(A-A^T)$  is

- (A) a symmetric matrix
- (B) a skew-symmetric matrix
- (C) a unit matrix
- (D) None of the above

100. Which among the following Industrial Policies in India is known as the 'Bible of state Capitalism'?

- (A) Industrial Policy, 1956
- (B) Industrial Policy, 1977
- (C) Industrial Policy, 1980
- (D) Industrial Policy, 1991