1. The *I–V* characteristics of a forword biased *p–n* junction diode looks like a straight line if one plots

(A) *V* versus *I*
(B) *ln V* versus *I*
(C) *V* versus *ln I*
(D) *ln V* versus 1/ *I*

2. Steel is more elastic than rubber because

(A) elastic limit of steel is higher than that of rubber.
(B) Young's modulus of steel is higher than that of rubber.
(C) density of steel is higher than that of rubber.
(D) rigidity or bulk modulus of steel is higher than that of rubber.

3. Who is the Secretary General of United Nations?

(A) Ana Maria Menéndez
(B) Maria Luiza Ribeiro Viotti
(C) Amina J. Mohammed
(D) Antonio Guterres

Select the appropriate word from the given options.

4. I took an aspirin to _____ the pain in my knee.

(A) cite
(B) deviate
(C) alleviate
(D) plagiarise

5. Which state celebrated the Pooram festival?

(A) Kerala
(B) Karnataka
(C) West Bengal
(D) Andhra Pradesh

6. What was the last position served by Arun Jaitley before taking retirement from his political career citing his health issues?

(A) External Affairs Minister
(B) Home Affairs Minister
(C) Finance Minister
(D) Defence Minister

7. A particle of unit mass is acted upon by a time-dependent force $F(t) = 3t - 2t^2$. If the particle is at rest at $t = 0$, its velocity will again be zero at

(A) $t = \frac{2}{3}$
(B) $t = 1$
(C) $t = \frac{3}{2}$
(D) $t = \frac{9}{4}$

8. Where will the India's first underwater train project is set to launch?

(A) Kolkata, West Bengal
(B) Varanasi, Uttar Pradesh
(C) Guwahati, Assam
(D) Mumbai, Maharashtra

9. A variable resistance *R* is connected across a fixed voltage supply *V*. The plot of *R* versus heat generated per unit time in the resistance looks like

(A) a straight line
(B) a rectangular hyperbola
(C) a parabola
(D) exponentially falling

10. How many members of Rajya Sabha are nominated by President of India?

(A) 2
(B) 10
(C) 12
(D) 15

11. Subroto Cup is associated with which sport?

(A) Cricket
(B) Football
(C) Chess
(D) Tennis

Select the appropriate word from the given options.

12. I need more examples to support my _____ that the college needs more parking spaces.

(A) contention
(B) modulation
(C) execution
(D) diction

13. Folk painting 'Madhubani' is famous in which state?

(A) Rajasthan
(B) Madhya Pradesh
(C) Odisha
(D) Bihar

14. The form of a potential is $V(x) = -\frac{1}{2}x^2 + \frac{1}{4}x^4$. A particle moving in this potential has

(A) stable equilibrium at $x = 0$, unstable equilibria at $x = \pm 1$.
(B) unstable equilibrium at $x = 0$, stable equilibria at $x = \pm 1$.
(C) stable equilibrium at $x = 0$, unstable equilibria at $x = \pm\sqrt{2}$.
(D) unstable equilibria at $x = 0, x = \pm\sqrt{2}$, stable equilibria at $x = \pm 1$.

15. In which year Protection of Women from Domestic Violence Act came into force?

(A) 2004
(B) 2006
(C) 2008
(D) 2010

16. Where was the G20 (Group of 20) Summit 2019 held?

(A) Riyadh, Saudi Arabia
(B) Buenos Aires, Argentina
(C) Osaka, Japan
(D) Beijing, China

From the options select the word furthest in meaning to the given word.

17. Salubrious

(A) Vigorous
(B) Overwhelmed
(C) Rustic
(D) Miasmic

18. The wavelength of the sodium D-lines is approximately 589 nm. The same line is seen at 595 nm in the light coming from a certain galaxy. If c is the velocity of light in vacuum, the galaxy is

(A) moving towards us with a velocity of approximately $10^{-4}c$.
(B) moving towards us with a velocity of approximately $10^{-2}c$.
(C) moving away from us with a velocity of approximately $10^{-4}c$.
(D) moving away from us with a velocity of approximately $10^{-2}c$.

19. Two vectors $C = A + B$ and $D = A - B$ are perpendicular to each other. Which of the following statements must be true?

(A) A must be perpendicular to B.
(B) $A = kB$ where k is some constant.
(C) A and B must have the same length.
(D) Either A or B must be a null vector.

20. The electric field associated with an electromagnetic wave is given by $E = a\sin(kx - \omega t)\hat{j}$. The wave is

(A) polarised along x.
(B) polarised along y.
(C) polarised along z.
(D) unpolarised.

21. Where is the headquarters of International Cricket Council (ICC) located?

(A) Jakarta, Indonesia
(B) Paris, France
(C) Washington D.C., U.S.
(D) Dubai, UAE

22. The binding energy of the electron at the ground state of the hydrogen atom is –13·6 eV. The binding energy of the electron of He^+ at $n = 2$ is

(A) –3·4 eV
(B) –13·6 eV
(C) –27·2 eV
(D) –54·4 eV

23. Who won Men's singles title in 2019 Wimbledon Championships?

(A) Novak Djokovic
(B) Roger Federer
(C) Juan Sebastián Cabal
(D) Nicolas Mahut

24. Where is the headquarters of European Union (EU) Commission located?

(A) Damascus, Syria
(B) Brussels, Belgium
(C) Berlin, Germany
(D) Ankara, Turkey

25. Three point charges $-q$, $+\alpha q$, and $-q$ are placed at three corners of a square, (1, 0), (0, 0) and (0, 1) respectively. If an unit charge is in equilibrium at (1, 1), the value of α is

(A) 2
(B) $2\sqrt{2}$
(C) 4
(D) $4\sqrt{2}$

26. The plates of a parallel-plate capacitor of capacitance C are initially at a potential difference V_1. It is then charged so that the potential difference grows to V_2. The change in electrostatic potential energy of the capacitor is

(A) $\frac{1}{2}C\left(V_2^2 - V_1^2\right)$
(B) $\frac{1}{2}C(V_2 - V_1)^2$
(C) $\frac{1}{2}CV_2(V_2 - V_1)$
(D) CV_1V_2

27. A biconvex lens has a radius of curvature $R = 80$ cm for both the surfaces. At what distance from the optical centre one should place an object to obtain a real image of the same size?

(A) 20 cm
(B) 40 cm
(C) 80 cm
(D) 160 cm

28. The half-life of a radioactive element is 20 s. It is found that at $t = 80$ s, there are N atoms of that element in a sample. At $t = 0$, the number of atoms of that element in the sample is approximately

(A) $4N$
(B) N^4
(C) $8N \ln 2$
(D) $16N$

29. The refractive index of water is $\frac{4}{3}$. For a light beam coming from water to air, the minimum angle of incidence for which total internal reflection occurs is

(A) $\sin^{-1}\left(\frac{3}{4}\right)$

(B) $\tan^{-1}\left(\frac{4}{3}\right)$

(C) $\tan^{-1}\left(\frac{3}{4}\right)$

(D) $\sin^{-1}\left(\frac{1}{3}\right)$

30. The coefficient of linear expansion of a solid is α. If at temperature T_0, the density of the solid be ρ_0, the density at temperature $4T_0/3$ is approximately

(A) $\rho_0(1-\alpha T_0)$

(B) $\rho_0(1-3\alpha T_0)$

(C) $\rho_0(1+\alpha T_0)$

(D) $\rho_0\left(1+\frac{4}{3}\alpha T_0\right)$

31. Two black bodies, one at temperature $2T$ and another at temperature $3T$, are kept in two thermally isolated evacuated chambers, both at temperature T. The ratio of the rate of heat loss is

(A) $\frac{1}{2}$

(B) $\frac{8}{27}$

(C) $\frac{16}{81}$

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

32. Where is the headquarters of Asian Development Bank located?

(A) Geneva, Switzerland

(B) Washington D.C., U.S.

(C) Mandaluyong, Manila, Philippines

(D) New York, U.S.

33. The famous book 'Anandamath' was authored by

(A) Sarojini Naidu

(B) Bankim Chandra Chattopadhyay

(C) Sri Aurobindo Ghosh

(D) Rabindranath Tagore

From the options select the word furthest in meaning to the given word.

34. Retaliation

(A) Breakdown

(B) Reconciliation

(C) Caution

(D) Rejection

35. An intrinsic semiconductor is

(A) an ohmic conductor, resistance increases with temperature.

(B) an ohmic conductor, resistance decreases with temperature.

(C) a non-ohmic conductor, resistance increases with temperature.

(D) a non-ohmic conductor, resistance decreases with temperature.

36. Name the military personnel, who was awarded with the Vir Chakra 2019 on Independence day 2019.

(A) Maheshkumar Bhure

(B) Ajveer Singh Chauhan

(C) Abhinandan Varthaman

(D) Amit Singh Rana

37. Which country is set to host the Football Asian Cup 2023?

(A) Russia
(B) India
(C) China
(D) Malaysia

38. The mass of a body is 100 gm and its density is 2·5 gm/cc. If placed in a liquid of density 2 gm/cc, the body will sink with an acceleration

(A) $2g$
(B) $g/3$
(C) $g/5$
(D) $3g/5$

39. Two planets A and B go around their star S in circular orbits. The distance between S and B is eight times that between S and A. One year of B is

(A) 4 years of A
(B) $\frac{1}{4}$ year of A
(C) $2\sqrt{2}$ years of A
(D) 8 years of A

40. The amendment of the constitution can be initiated in which of the following?

(A) Lok Sabha only
(B) Rajya Sabha only
(C) Any House of the Parliament
(D) Assembly of a state

41. Who is the Minister of Railways of India?

(A) Amit Shah
(B) Piyush Goyal
(C) Raj Nath Singh
(D) Nitin Jairam Gadkari

42. The band gap of a typical intrinsic semiconductor is of the order of

(A) 10^{-12} J
(B) 10^{-16} J
(C) 10^{-19} J
(D) 10^{-22} J

43. Container A of volume $2V$ contains an ideal gas at pressure P and temperature T. Container B of volume V contains the same gas at pressure P and temperature $2T$. When the two containers are joined so that the gases mix, the final temperature, assuming no heat loss, will be

(A) $\frac{3}{2}T$
(B) $\frac{4}{3}T$
(C) $\frac{5}{4}T$
(D) $\frac{6}{5}T$

44. Where was the 45th G7 Summit for the year 2019 held?

(A) Rome, Italy
(B) Berlin, Germany
(C) Ottawa, Canada
(D) Biarritz, France

45. The temperature of a body drops from 2100 K to 900 K in 60 s. If the room temperature is 300 K, the time taken for the body to cool from 900 K to 600 K will be

(A) 15 s
(B) 30 s
(C) 60 s
(D) 120 s

46. Who appoints the Chief Election Commissioner of India?

(A) Prime Minister
(B) Election Commission
(C) President
(D) Council of Ministers

47. Consider earth to be a solid sphere of uniform density. If its radius decreases by 1% keeping its mass constant, how should the acceleration due to gravity g change at the surface of the earth?

(A) g decreases by approximately 1%.
(B) g decreases by approximately 2%.
(C) g increases by approximately 2%.
(D) g increases by approximately 1%.

48. The first woman to climb Mount Everest was

(A) Marie Jose Perec
(B) Florence Grifth Joyner
(C) Jackie Joyner Kersee
(D) Junko Tabei

49. The Promulgation of an ordinance by an President is done

(A) when President feels that ordinance should be promulgated (on discretion).
(B) when Supreme Court advises the President.
(C) when Council of Ministers advises President.
(D) when any house of the parliament passes a resolution.

50. Who sworn in as the first full time female Finance Minister of India on 31st May, 2019?

(A) Nirmala Sitharaman
(B) Smriti Zubin Irani
(C) Debasree Chaudhuri
(D) Renuka Singh Saruta

51. The radioactive nucleus ${}_{11}Na^{22}$ decays to ${}_{10}Ne^{22}$. One of the particles emitted during the decay is

(A) an electron
(B) a positron
(C) a proton
(D) a neutron

52. A mud ball of mass 99gm and moving with a velocity v hits another small mud ball of mass 1gm at rest. After collision the two mud balls stick together. The fractional loss of kinetic energy is

(A) 11·1%
(B) 99%
(C) 1%
(D) $\sqrt{99}\%$

53. Earth's atmosphere can support 76 cm of mercury column. If the atmospheric pressure at the sea level becomes 0·1 atmosphere, and the acceleration due to gravity becomes $g/2$ from g, the supported mercury column will have a maximum length of

(A) 152 cm
(B) 15·2 cm
(C) 7·6 cm
(D) 380 cm

54. Three point masses are places on the x–y plane as: m at (0,0); $2m$ at (3,0); $3m$ at (0,2). The centre of mass will be at

(A) $\left(\frac{2}{3}, \frac{3}{2}\right)$
(B) $\left(\frac{3}{2}, \frac{2}{3}\right)$
(C) $\left(1, \frac{2}{3}\right)$
(D) $(1,1)$

55. Silent Valley National Park located in which state?

(A) Karanataka
(B) Kerala
(C) Maharashtra
(D) Andhra Pradesh

56. Who is the author of the book 'My Experiments with Truth'?

(A) Mahatma Gandhi
(B) Michael Anderson
(C) Winston Churchill
(D) Jarnes Morris

57. Which country will host the G20 Summit 2020?

(A) Japan
(B) Italy
(C) France
(D) Saudi Arabia

58. A point-like bob of mass 20 gm is performing a simple harmonic motion whose equation is $x = 10\sin\left(100t + \frac{1}{6}\pi\right)$. Its maximum kinetic energy is

(A) 1 J
(B) 2 J
(C) $1/\left(4\pi^2\right)$ J
(D) 0·5 J

59. What does the term PC mean?

(A) Professional Computer
(B) Personal Computer
(C) Private Computer
(D) Personal Calculator

60. Let the radius of the first Bohr orbit be a_0. The de Broglie wavelength of the electron in the ground state of the hydrogen atom is

(A) a_0
(B) πa_0
(C) $2\pi a_0$
(D) $2a_0/\pi$

61. Cyclone Fani hits Odisha and West Bengal recently, which country has suggested the name 'Fani'?

(A) Maldives
(B) Myanmar
(C) Oman
(D) Bangladesh

62. The dimension of hc, where h is the Planck's constant and c is the velocity of light in vacuum, is that of

(A) force × length
(B) energy × length
(C) energy × time
(D) force × linear momentum

63. Two spherical plantes A and B are made of the same material and have uniform density. The surface gravity of A is twice that of B. The ratio of the mass of A and the mass of B is

(A) 8 : 1
(B) 2 : 1
(C) $1 : 2\sqrt{2}$
(D) $4^{\frac{1}{3}} : 1$

64. A region in space contains an electric field and a magnetic field, both from negative z to positive z direction. If an electron, moving along the z-axis from negative to positive z, enters the region, it will travel in

(A) a parabola
(B) a spiral
(C) a circle
(D) a straight line

65. A circular loop of wire has an equivalent resistance of R when current enters and exits the loop through the end points of a diameter. If the loop is cut and made into a straight wire, its resistance will be

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

66. Who won the contest for the British Prime Minister (PM) in 2019?

(A) Harold Wilson
(B) Boris de Pfeffel Johnson
(C) Gordon Brown
(D) Margaret Thatcher

67. The ratio of inductance L and resistance R has a dimension of

(A) s^{-1}
(B) s
(C) s^2
(D) s^{-2}

68. A particle starts with some nonzero initial velocity and moves under steady deceleration till it comes to rest. The velocity versus distance traversed plot will be

(A) a parabola.
(B) a rectangular hyperbola.
(C) a straight line with a positive slope.
(D) a straight line with a negative slope.

69. The first Indian Mathematician who treated Mathematics as a different discipline?

(A) Varahmihira
(B) Aryabhatta
(C) Ramanujan
(D) Baudhayan

70. A uniform solid sphere of mass M and radius R is rotating about its diameter with angular velocity ω. If it suddenly shrinks to radius $R/2$ keeping its mass unchanged, the angular velocity will be

(A) $\frac{1}{2}\omega$
(B) $\sqrt{2}\omega$
(C) 2ω
(D) 4ω

71. Saraswati Samman is given annually for outstanding contribution to which field?

(A) Dance
(B) Classical Music
(C) Literature
(D) Painting

72. A source of sound is emitting a fixed frequency ν. You are moving around it in a circle with uniform speed. To you, the frequency will appear to be

(A) equal to ν.
(B) more than ν.
(C) less than ν.
(D) either more or less than ν, depending on which way you move.

73. The de Borglie wavelength of a ball of mass 0·1 kg moving with a velocity of 30 m/s is about

(A) 10^{-34} m
(B) 10^{-27} m
(C) 10^{-12} m
(D) 10^{19} m

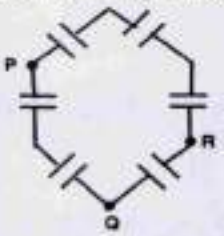
74. Where is the headquarters of World Bank located?

(A) Vienna, Austria
(B) Paris, France
(C) Washington D.C., United States
(D) Geneva, Switzerland

75. A steel ball of mass 1kg falls vertically on a soft mattress from a height of 20 m and comes to rest in 0·5 s. What is the average force on the mattress? (Take $g = 10 m/s^2$ and the initial velocity of the ball to be zero.)

(A) 40 N
(B) 10 N
(C) 5 N
(D) 20 N

76. Six capacitors each of capacitance C are connected to form a hexagon (see figure). The ratio of the equivalent capacitances $C_{PQ} : C_{PR}$ is



(A) 3 : 2
(B) 5 : 4
(C) 7 : 6
(D) 9 : 8

77. A ball is thrown vertically upwards from the ground with a velocity v. At a hight h above the ground, its potential energy is found to the twice its kinetic energy there. If the upward velocity at that height be v_1, v/v_1 is equal to (neglecting air resistance)

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

78. Which planet looks reddish in the night sky?

(A) Pluto
(B) Earth
(C) Saturn
(D) Mars

Choose the option that best expresses the meaning of the given idiom/phrase.

79. Those were only crocodile tears.

(A) Pretended sadness
(B) A weeping sign
(C) Genuine regret
(D) Very gloomy

80. Where is the country's largest brackish water lagoon, Chilika lake located?

(A) Maharashtra
(B) Odisha
(C) West Bengal
(D) Assam

81. Faint blue light and bright red light fall on the same metal and they both eject photoelectrons. Which of the following is true?

(A) Faint blue light ejects less number of electrons but with more average kinetic energy.
(B) Faint blue light ejects more number of electrons but with less average kinetic energy.
(C) Faint blue light ejects more number of electrons and with more average kinetic energy.
(D) Faint blue light ejects less number of electrons and with less average kinetic energy.

82. The velocity of sound in air is 330 m/s. A tube of length 55 cm and open at both ends is producing the first harmonic. The frequency is

(A) 300 Hz
(B) 450 Hz
(C) 600 Hz
(D) 750 Hz

83. Two waves, given by $x_1 = 3\sin\left(100t + \frac{1}{3}\pi\right)$ and $x_2 = 2\sin\left(100t - \frac{1}{3}\pi\right)$ superpose and form interference pattern. The ratio of the maximum and minimum intensities will be

(A) 9 : 4
(B) 5 : 1
(C) 3 : 1
(D) 25 : 1

Choose the option that best expresses the meaning of the given idiom/phrase.

84. Their attempt to get back the stolen necklace was a wild goose chase.

(A) Wise decision
(B) Useless search
(C) Timely action
(D) Delayed action

85. The origin of frictional force is

(A) only gravitational
(B) only nuclear
(C) only electromagnetic
(D) both gravitational and electromagnetic

86. Two positive point charges $+q$ and $+q$ are separated by a distance d. Its dipole moment is

(A) zero.
(B) undefined.
(C) qd and is independent of the choice of the origin.
(D) nonzero but depends on the choice of the origin.

From the given options, select the word nearest in meaning to the given word.

87. Vital

(A) Rebuke
(B) Emerge
(C) Essential
(D) Demean

88. Where is the Lord's Cricket Ground located?

(A) Washington D.C., U.S.
(B) Paris, France
(C) London, England
(D) Geneva, Switzerland

89. What type of Party System has been evolved in India?

(A) Single Party System
(B) Bi-party System
(C) Multiparty System
(D) Triparty System

90. Which team won the 12th edition of Indian Premier League or IPL 2019?

(A) Chennai Super Kings
(B) Mumbai Indians
(C) Delhi Capitals
(D) Sunrisers Hyderabad

91. Komalika Bari, who is in news recently is associated with which sport?

(A) Archery
(B) Fencing
(C) Badminton
(D) Shooting

92. The magnetic flux Φ linked with a conducting loop varies with time as $\Phi(t) \propto t(\log t - 1)$ for $t > 0$. The induced electric field is proportional to

(A) $\log t - t$
(B) $\log t$
(C) $(t-1)(\log t - 1)$
(D) $t \log t$

93. Who was the President of the Constituent Assembly?

(A) Dr. Rajendra Prasad
(B) B.R. Ambedkar
(C) Vallabbhai Patel
(D) Sarvepalli Radhakrishnan

94. Gir Forest National Park is located in which state?

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

From the options select the word furthest in meaning to the given word.

95. Insolence

(A) Futuristic
(B) Respectfulness
(C) Tolerance
(D) Aptitude

96. One can produce a stable heavy nucleus by fusing lighter nuclei. This process cannot go beyond

(A) $_{20}Ca^{40}$
(B) $_{82}Pb^{206}$
(C) $_{30}Zn^{64}$
(D) $_{26}Fe^{56}$

97. If there is no damping, the position versus velocity plot for a simple harmonic oscillator is

(A) a straight line
(B) a rectangle
(C) an ellipse
(D) a spiral

98. A wire of length L is hanging vertically. When a mass M is attached to the free end, the length of the wire increases by an amount l. The elastic potential energy stored in the wire is

(A) Mgl
(B) $\frac{1}{2}Mgl$
(C) Mgl^2/L
(D) $Mgl^2/(2L)$

Select the appropriate word from the given options.

99. I put my art projects in my _____ to keep them from getting ruined when I take them to class.

(A) encrypt
(B) carcinogen
(C) prerogative
(D) portfolio

From the given options, select the word nearest in meaning to the given word.

100. Visionary

(A) Idealistic
(B) Burdensome
(C) Unromantic
(D) Practical