

1. A table is at rest on a horizontal floor and a box is at rest on the table. If the force exerted by the Earth on the box is taken as the action force the reaction force is the :
 - (A) Force exerted by the table on the box
 - (B) Force exerted by the box on the table
 - (C) Force exerted by the table on the horizontal floor
 - (D) Force exerted by the box on the Earth
2. A body is released from rest at a height H above the ground. The speed with which the body reaches the ground is :
 - (A) Proportional to H
 - (B) Proportional to the square root of H
 - (C) Proportional to H^2
 - (D) Independent of H
3. The sound wave :
 - (A) Propagates as a longitudinal wave in a material medium
 - (B) Propagates as a transverse wave in a material medium
 - (C) Can propagate in a gaseous medium but not in a solid
 - (D) Can propagate both in vacuum and in gaseous medium
4. A light ray moves from air to glass. Which of the following is correct ?
 - (A) The frequency and wavelength change in glass.
 - (B) The wavelength and the speed of propagation change in glass.
 - (C) The frequency and the speed of propagation change in glass.
 - (D) Neither the frequency nor the wavelength changes in glass. Only the speed of propagation changes.
5. A liquid has attained its temperature of its boiling point under normal atmospheric pressure. When further heat is supplied to the liquid :
 - (A) Its temperature increases
 - (B) Its temperature decreases
 - (C) Its temperature remains constant and it undergoes phase transition
 - (D) It starts solidifying immediately
6. A steady electric current passes through a long, straight conductor. The magnetic lines of force due to the current :
 - (A) Are straight lines parallel to the conductor along the direction of the current
 - (B) Are straight lines parallel to the conductor and opposite to the direction of the current
 - (C) Originate from the straight conductor and also end there
 - (D) Concentric circles with centre at the conductor

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7. Which of the following devices is based on the principle of Faraday's law of electromagnetic induction ?
 (A) Transformer
 (B) LED lamp
 (C) Incandescent lamp
 (D) Magnetic compass
8. The SI unit of magnetic field is :
 (A) Gauss
 (B) Siemens
 (C) Tesla
 (D) Weber
9. A particle of charge 1.5 Coulomb moves from a point A to a point B. If the work done on the particle is 30 Joule, the electric potential difference between the points A and B is :
 (A) 4.5 Volt
 (B) 0.05 Volt
 (C) 20 Volt
 (D) 45 Volt
10. The focal length of a concave mirror is 12 cm. If an object is placed at a distance of 8 cm from the mirror, the image formed in the mirror is :
 (A) Virtual, inverted and diminished
 (B) Virtual, erect and magnified
 (C) Real, erect and magnified
 (D) Real, inverted and diminished
11. What is the wave number of radiation whose wavelength is 2.5μ ?
 (A) 2000 cm^{-1}
 (B) 4000 cm^{-1}
 (C) 1000 cm^{-1}
 (D) 3000 cm^{-1}
12. The number of nodal planes in 3s orbital is :
 (A) 0
 (B) 1
 (C) 2
 (D) 3
13. 1.0 mole of CO_2 contains :
 (A) 6.02×10^{23} atoms of C
 (B) 6.02×10^{23} atoms of O
 (C) 18.1×10^{23} molecules of CO_2
 (D) 3 gm. atoms of CO_2
14. The number of grams of H_2SO_4 present in 0.25 mole of H_2SO_4 is :
 (A) 0.245
 (B) 2.45
 (C) 24.5
 (D) 49.0
15. Which one of the following factors is the most important in making fluorine the strongest oxidising agent ?
 (A) Electron affinity
 (B) Ionisation enthalpy
 (C) Bond dissociation energy
 (D) Hydration enthalpy

16. The weakest acid among the following is :
 (A) HI
 (B) HBr
 (C) HF
 (D) HCl
17. Xenon hexafluoride reacts with silica to form a Xenon compound 'X'. The oxidation state of Xenon in 'X' is :
 (A) + 2
 (B) + 4
 (C) 0
 (D) + 6
18. KMnO_4 is used as :
 (A) Reducing agent and disinfectant
 (B) Reducing agent and antiseptic
 (C) Oxidising agent and disinfectant
 (D) Oxidising agent and antiseptic
19. The reaction between barium chloride and sodium sulphate goes to completion because :
 (A) Barium sulphate is almost insoluble
 (B) The solubility of barium chloride decreases
 (C) Lattice energy of barium sulphate is very high
 (D) The reaction is irreversible in nature
20. Which one of the following transition metal ions is diamagnetic ?
 (A) Co^{2+}
 (B) Zn^{2+}
 (C) Ni^{2+}
 (D) Cu^{2+}
21. In a prokaryotic cell, the site of respiratory enzymes is :
 (A) Nucleoid
 (B) Cytoplasm
 (C) Mesosome
 (D) Chromatophore
22. Sandwich model of structural organization of cell membrane was proposed by :
 (A) Danielli and Davson
 (B) Robertson
 (C) Gorter and Grendel
 (D) Singer and Nicolson
23. With reference to Endoplasmic Reticulum, which one is not a type of structure ?
 (A) Cisternae
 (B) Vesicles
 (C) Tubules
 (D) F_1 particles

24. Granum is seen in :
 (A) Mitochondria
 (B) Chloroplast
 (C) Nuclear pore complex
 (D) Lysosomes
25. The plants known as 'Horsetails' belong to :
 (A) Bryophytes
 (B) Pteridophytes
 (C) Gymnosperms
 (D) Angiosperms
26. Which are known as 'Amphibians of Plant Kingdom' ?
 (A) Algae
 (B) Fungi
 (C) Bryophytes
 (D) Pteridophytes
27. Stele is found in which one of the followings ?
 (A) *Microcystis*
 (B) *Saccharomyces*
 (C) *Porella*
 (D) *Adiantum*
28. Which state of India has the largest forest area ?
 (A) Madhya Pradesh
 (B) Uttar Pradesh
 (C) Arunachal Pradesh
 (D) Andhra Pradesh
29. Which one is used in energy-generating nuclear reactors ?
 (A) Uranium – 216
 (B) Uranium – 218
 (C) Uranium – 235
 (D) Uranium – 258
30. Which country has put forward the concept of 'One Sun One World One Grid' ?
 (A) India
 (B) USA
 (C) England
 (D) Germany
31. According to food habit, what kind of teeth are present in human beings ?
 (A) Bunodont
 (B) Secodont
 (C) Selenodont
 (D) Lophodont
32. At which thoracic vertebrae in human does the trachea branch ?
 (A) Sixth
 (B) Fourth
 (C) Fifth
 (D) Second

IH – 2D/18

(5)

(Turn over)

33. Which of the following vessels carries blood with minimum urea ?
 (A) Renal artery
 (B) Renal vein
 (C) Hepatic vein
 (D) Hepatic portal vein
34. After ovulation Graafian follicles regress into :
 (A) Corpus atresia
 (B) Corpus callosum
 (C) Corpus luteum
 (D) Corpus albicans
35. Identify the odd one from the following.
 (A) Fimbriae
 (B) Isthmus
 (C) Infundibulum
 (D) Labiaminora
36. The major aerosol pollutant in jet plane emission is :
 (A) Sulphur dioxide
 (B) Carbon monoxide
 (C) Methane
 (D) Fluorocarbon
37. The Montreal Protocol (1987) is connected with :
 (A) Reduction in CFC
 (B) Reduction in emission of green house gases
 (C) Reduction in use of energy
 (D) Sustainable development of wetlands
38. Mucor and Aspergillus are examples of :
 (A) Producers
 (B) Primary consumer
 (C) Secondary consumer
 (D) Decomposer
39. The natural reservoirs of Phosphorous is :
 (A) Atmosphere
 (B) Rocks
 (C) Ocean
 (D) Dead organisms
40. How much energy the producer trophic level will have if the amount of energy available at the third trophic level is 10 J ?
 (A) 10 J
 (B) 100 J
 (C) 1000 J
 (D) 10000 J
41. The digit in the unit place of $(2018)^{2018} + (2019)^{2019} + (2020)^{2020}$ is :
 (A) 7
 (B) 4
 (C) 3
 (D) 1

42. How many proper subsets of the set $\{1, 2, 3, 4, 5, 6, 7\}$ contain the numbers 1 and 7 ?

- (A) 32
- (B) 31
- (C) 30
- (D) 28

43. The sum of three numbers is 98. If the ratio of the first to second is 2 : 3 and that of the second to the third is 5 : 8, then what is the second number ?

- (A) 58
- (B) 48
- (C) 30
- (D) 25

44. For positive integers x, y, z , if $x : (y + z) = 1 : 3$ and $z : (x + y) = 5 : 7$, then $y : (x + z)$ is equal to :

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

45. If $S = \{(x, y) \in \mathbb{R}^2 : y = x + 1\}$, then which one of the following statements is correct ?

- (A) S is an equivalence relation

(B) S is a reflexive, but not symmetric and transitive relation

(C) S is symmetric and transitive, but not a reflexive relation

(D) S is not a reflexive, not a symmetric and not a transitive relation

46. On the sets $A = [-1, 1]$, $B = [0, 1]$ and $C = [-1, 0]$, consider the following relations :

$$S_1 = \{(x, y) \in A \times A : x^2 + y^2 = 1\}$$

$$S_2 = \{(x, y) \in A \times B : x^2 + y^2 = 1\}$$

$$S_3 = \{(x, y) \in A \times C : x^2 + y^2 = 1\}$$

$$S_4 = \{(x, y) \in B \times C : x^2 + y^2 = 1\}$$

Then which one of the following options is correct ?

- (A) Only S_1 is not a function
- (B) Only S_1 and S_2 are not functions
- (C) Only S_2 and S_3 are not functions
- (D) Only S_1, S_3 and S_4 are not functions

47. How many pairs of $x, y \in \mathbb{R}$ satisfy these two equations : $x + |y| = 8$ and $|x| + y = 6$?

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

$$\begin{aligned} x + |y| &= 8 \\ |x| + y &= 6 \end{aligned}$$

(Turn over)

48. The roots of the quadratic equations

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}, a+b \neq 0 \text{ are :}$$

- (A) $-a$ and $-b$
- (B) $-a$ and b
- (C) a and $-b$
- (D) a and b

49. P takes 6 days less than Q to finish a piece of work. If both P and Q together can finish the work in 4 days, then the time taken by Q to finish the work is :

- (A) $11\frac{1}{2}$ days
- (B) 12 days
- (C) 13 days
- (D) 15 days

50. If the polynomial $p(x) = 6x^3 + 13x^2 + \alpha x + \beta$ is divisible by $q(x) = 2x^2 + 7x - 4$ then, which one of the following is true ?

- (A) $4x - 3$ is a factor of $p(x)$
- (B) $4x + 3$ is a factor of $p(x)$
- (C) $3x + 4$ is a factor of $p(x)$
- (D) $3x - 4$ is a factor of $p(x)$

51. If $(25)^{7.5} \times (5)^{2.5} \div (125)^{1.5} = 5^x$, then the value of x is :

- (A) 17.5
- (B) 15
- (C) 13
- (D) 8.5

52. If $\log_2 (\log_3 (\log_2 x)) = 1$, then what is the value of x ?

- (A) 27
- (B) 64
- (C) 125
- (D) 512

53. The value of $(0.2)^{\log_{\sqrt{5}} \left(\frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots \right)}$ is :

- (A) 4
- (B) 2
- (C) $\log(2)$
- (D) $2 \log(2)$

54. If $\cos^{-1} \left(\frac{1}{\sqrt{5}} \right) = \theta$, then what is the value of $\operatorname{cosec}^{-1} (\sqrt{5})$?

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

55. What will be the value of $(3 \cos 80^\circ) (\operatorname{cosec} 10^\circ) + (2 \cos 59^\circ) (\operatorname{cosec} 31^\circ)$?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

56. Which one of the following statements is false ?
 (A) Any point is zero dimensional
 (B) Any straight line is one dimensional
 (C) A circle is two dimensional
 (D) Any plane is two dimensional
57. If the angles of elevation of the top of a tower from two points lying at a distance of 4 meters and 9 meters from the foot are complementary, then what is the height of the tower ?
 (A) 8 meters
 (B) 6 meters
 (C) 5.5 meters
 (D) 5 meters
58. An equilateral $\triangle ABC$ is inscribed in a circle. If D is a point on the minor arc BC and the measure of the $\angle CBD = 40^\circ$, then what is the measure of the $\angle BCD$?
 (A) 20°
 (B) 30°
 (C) 45°
 (D) 60°
59. How many revolutions per minute a wheel of radius 14 cm of a car will make to maintain a speed of 132 km / hour ?
 (A) 1250
 (B) 1500
 (C) 2500
 (D) 3000
60. A parallelogram circumscribing a circle is a :
 (A) Trapezium
 (B) Rhombus
 (C) Square
 (D) Rectangle
- Read the following passage carefully and answer the questions (Q. Nos. 61 to 64) choosing the correct alternatives :*
- Man does not live by food alone. Whereas we can do for weeks without food, we cannot live without water longer than a couple of days. Water is vital to human health and fitness. Although it is not a nutrient as are carbohydrates, fats, proteins, vitamins and minerals, it, in fact, is a key nutrient as no life is possible without it. Water approximates 60 percent of the body weight of human adults. It is an excellent solvent—more substances are soluble in water than in any other liquid known so far. This makes it an ideal constituent of the body fluids which sustain life supporting chemical reactions. It dissolves varied products of digestion and transports them to the rest of the body. Similarly, it dissolves diverse metabolic wastes and helps drain them out of the body. Besides, role of water in distributing the body heat efficiently, thereby regulating body's temperature is vital. Water accomplishes this role ideally because it has high thermal conductivity ensuring rapid

heat transfer from one part to the other. Drinking a lot of water is an inexpensive way to stay healthy. Even excess of water is harmless. Drinking a litre of water, the first thing that we do in the morning, is kidney-friendly.

61. Why is water called a key nutrient ?

- (A) It dissolves different products of digestion.
- (B) No life is possible without it.
- (C) It carries products to the rest of the body.
- (D) It raises temperature of the body.

62. Which of the following statements is not true ? (x)

- (A) Water regulates body temperature. ✓
- (B) Excess water is not harmful. ✓
- (C) Excess water is not harmless. ✓
- (D) Water transports nutrients to the body. ✓

63. Water is an ideal constituent of the body fluids because :

- (A) It is an excellent solvent.
- (B) It dissolves metabolic wastes.
- (C) It drains wastes out of the body.
- (D) It is kidney-friendly.

64. What is the vital role of water in human body ?

- (A) To sustain life supporting chemical reactions.
- (B) To dissolve wastes.

- (C) To regulate body's temperature.
- (D) To regulate excretion of urine.

Answer the questions (Q. Nos. 65 to 70) choosing the correct alternatives :

65. The word which means the same as 'excellent' is :

- (A) Terrible
- (B) Worthless
- (C) Insignificant
- (D) Extremely good

66. The word opposite in meaning to 'natural' is :

- (A) Innocent
- (B) Real
- (C) Artificial
- (D) Simple

67. Study of the relation between the organism and their environment is :

- (A) Demography
- (B) Ecology
- (C) Entomology
- (D) Genetics

68. People _____ live in glass houses should not throw stones at others.

Pick out the correct word to complete the sentence.

- (A) which
- (B) whom
- (C) those
- (D) who

69. Which of the following sentences is correct ?
- (A) Lata sang sweetly in the concert last evening.
- (B) Lata sang in the concert last evening sweetly.
- (C) Lata sang last evening sweetly in the concert.
- (D) Lata sang in the concert sweetly last evening.

70. Identify the correct sentence :
- (A) Please advise me what shall I do with this money.
- (B) Please advise me how shall I pay back your money.
- (C) Please tell me when we shall meet again.
- (D) Please inform me where can I get the book.

71. Which of the following is used in the common TV remote control ?
- (A) Ultrasonic wave
- (B) LASER wave
- (C) Radio wave
- (D) Infrared wave

72. Which of the following is the largest organ in the human body ?
- (A) Lungs

- (B) Skin
- (C) Brain
- (D) Large intestine

73. Most significant events in a Political System are caused by :
- (A) Institutional factors alone
- (B) Individual Politicians
- (C) Political Groupings
- (D) The interaction of several different factors

74. What is the proposed new name for the Legal Code for India, replacing Indian Penal Code (IPC) ?
- (A) Bharatiya Nyaya Sanhita
- (B) Indian Nyaya Sanhita
- (C) Nava Bharat Sanhita
- (D) Bharat Penal Code

75. Who is the present Speaker of Lok Sabha ?
- (A) Om Birla
- (B) Kodikunnil Suresh
- (C) Bhartruhari Mahatab
- (D) Jagdeep Dhankar

76. Which of the following countries is not a member of ASEAN ?
- (A) Indonesia
- (B) Vietnam
- (C) India
- (D) Thailand

77. Which of the following Articles of the Indian Constitution makes education a Fundamental Right ?
 (A) Article 20
 (B) Article 21
 (C) Article 21A
 (D) Article 45
78. "Education and National Development" is the title of the report of :
 (A) Indian Education Commission, 1882-83
 (B) University Education Commission, 1948-49
 (C) Secondary Education Commission, 1952-53
 (D) Education Commission, 1964-66
79. RCFCE Act, 2009 is primarily meant for the children in the age group of :
 (A) 3-6 years
 (B) 6-11 years
 (C) 6-14 years
 (D) 6-16 years
80. "Operation Blackboard", the programme to equip all primary schools in the country with minimum required facilities, was recommended by :
 (A) NPE, 1968
 (B) NPE, 1986
 (C) NCF, 2005
 (D) RCFCE, 2009
81. How many minutes before 12 noon is it when it is 27 minutes past 10 A.M. ?
 (A) 30
 (B) 93
 (C) 49
 (D) 94
82. People in the South have observed that heavy frost is usually preceded by a full moon. They are convinced that the full moon somehow generates the frost. Which of the following, if true, would weaken the people's conviction ?
 (A) The temperature must fall below 10 degrees Celsius (50 degrees Fahrenheit) for frost to occur.
 (B) Absence of a cloud cover cools the ground which causes frost.
 (C) People are superstitious.
 (D) People are not experts in Meteorology.
83. If $A \times B$ implies $A^2 + B^2$, $A \vee B$ implies $A^2 - B^2$, $A \wedge B$ implies $(A + B)^2$, $A \oplus B$ implies $(A - B)^2$, calculate the value of $(373) \text{ M } (413)$:
 (A) 1600
 (B) 900
 (C) 400
 (D) 2500

84. Arvind said, "This girl is the sister of the grandson of my mother." How is this girl related to Arvind ?

- (A) Daughter
(B) Niece
(C) Sister
(D) Cousin

- (C) 16
(D) 18

87. At the birthday party of Anil, a baby boy, 40 persons chose to kiss him and 25 chose to shake hands with him. 10 persons chose to both kiss him and shake hands with him. How many persons turned out at the party ?

- (A) 35
(B) 75
(C) 55
(D) 25

85. Which of the following cannot be a number of the series 64, 125, 216, 343, 512, ?

- (A) 8
(B) 729
(C) 27
(D) 999

88. In 1980, UP earned Rs. 17 million in tourist revenue. By 1990, tourist revenue doubled and in 2000, it reached the sum of Rs. 132 million. Each of the following, if true, may explain the trend in tourist revenue except:

- (A) The number of tourists has increased from 1940 to 1980.
(B) Average expenditure per tourist has increased.
(C) Average stay per tourist has increased.
(D) The number of total hotel rooms has increased.

86. A, B, C, D and E are five different integers. When written in the ascending order of values, the difference between any two adjacent integers is 4. 'D' is the greatest and 'A' is the least. B is greater than E but less than C. The sum of the integers is equal to E. What is the positive difference between the lowest and the highest integers ?

- (A) 8
(B) 6

89. My next door neighbour lies a lot. In fact, he only tells the truth on one day a week ! One day he told me, "I lie on Mondays and on Tuesdays." The next day he said, "Today is either Thursday, Saturday or Sunday." The next day he said, "I lie on Wednesdays and Fridays." On which day of the week does my neighbour tells the truth ?
(A) Monday
(B) Tuesday
(C) Wednesday
(D) Thursday
90. In a row of children, Bali is seventh from the left and Moti is fourth from the right. When Bali and Moti exchange positions, Bali will be fifteenth from the left. What will be Moti's position from the right ?
(A) Eighth
(B) Fourth
(C) Eleventh
(D) Twelfth
91. All the teacher education colleges in Odisha are under the administrative control of :
(A) SCERT, Odisha.
(B) Directorate of Secondary Education.
(C) Directorate of Higher Secondary Education.
(D) Department of Higher Education.
92. Teaching is best defined as :
(A) Transferring knowledge from teachers to learners.
(B) Controlling learners in the classroom for timely progress and completion of the course.
(C) Facilitating learning.
(D) Lecturing and explaining.
93. Who said, "The destiny of India is being shaped in her classrooms" ?
(A) Report of the Education Commission, 1964-66
(B) NPE, 1968
(C) NPE, 1986
(D) NEP, 2020
94. SAMS is an integrated portal which provides a common platform for admission into various courses across Odisha through e-admission and also several e-Services to students. What is the full expansion of SAMS ?
(A) Students Admission Management System.
(B) Student Academic Management System.
(C) Student Academic Monitoring System.
(D) Students Admission Monitoring System.

95. According to NEP-2020, which of the following age groups corresponds to the foundational stage ?

- (A) 3-8 years
- (B) 8-11 years
- (C) 11-14 years
- (D) 14-18 years

96. Which of the following is not a function of educational aims ?

- (A) Providing direction to learning activities.
- (B) Providing adequate resources to schools.
- (C) Setting standards for evaluation of learning outcomes.
- (D) Creating and sustaining learners' motivation.

97. Which of the following is the highest level of teaching ?

- (A) Memory level
- (B) Reflective level
- (C) Understanding level
- (D) None of the above

98. Bloom's taxonomy of educational objectives is :

- (A) A collection of teaching strategies.
- (B) A classification of teaching skills.
- (C) A classification of learning skills.
- (D) A collection of hierarchical classification of educational objectives.

99. _____ is defined as relatively permanent change in behaviour.

- (A) Creativity
- (B) Psychology
- (C) Learning
- (D) Attention

100. What is the expansion of CABE ?

- (A) Central Academic Body for Education.
- (B) Constitutional Amendment for Broader Education.
- (C) Central Authority for Betterment of Education.
- (D) Central Advisory Board of Education.

$$\frac{2}{3} \times \frac{5}{8}$$

$$\Rightarrow 16 = 15$$

$$x + 2x + 3x$$

$$= 6x = 91$$

$$\Rightarrow x = \frac{91}{6}$$

Ball motip

