1. Learning is a more or less _____ modification of behaviour.

(A) Temporary
(B) Permanent
(C) Fast
(D) Slow

2. Which of the following laws necessitates creation of motivation in children before taking up learning task ?

(A) Law of readiness
(B) Law of use
(C) Law of disuse
(D) Law of effect

3. The concept 'zone of proximal development' occurs in the learning theory of _____.

(A) Piaget
(B) Vygotsky
(C) Kohler
(D) Thorndike

4. Which of the following psychologists advocated the idea of 'congruence between real self and ideal self ?

(A) Lev Vygotsky
(B) Abraham Maslow
(C) Jean Piaget
(D) Carl Rogers

5. Which of the following statements is true ?

(A) Learning and maturation are unrelated
(B) Learning brings about maturation
(C) Maturation creates favourable conditions for further learning
(D) Maturation is a result of learning

6. The approach to instruction that is the most beneficial and positive for all learners is :

(A) Teacher:centric
(B) Learner:centric
(C) Subject:centric
(D) Knowledge:centric

7. Variety in content delivery formats in class room leads to :

(A) Promotion of hard work by learners
(B) Confusion among learners
(C) Promotion of uniform learning
(D) Better learning by diverse learners

8. Which of the following is NOT a component of effective organization of learning?

(A) Clear learning objectives

(B) Varied instructional strategies

(C) Uniform instruction for all students

(D) Continuous assessment and feedback

9. What is the role of scaffolding in organizing learning?

(A) To simplify complex topics

(B) To challenge students with difficult tasks

(C) To provide support to students while learning new skills

(D) To prevent students from making mistakes

10. If a child loves reading story books often, it is a case of _____ motivation.

(A) Intrinsic (B) Extrinsic

(C) Both of the above (D) None of the above

11. Which of the following is NOT a characteristic of self:learning?

(A) Following teacher recommended pace (B) Setting a personalized pace

(C) Having autonomy (D) Embracing responsibility

12. Which of the following is NOT a common group learning activity?

(A) Group discussion (B) Peer teaching

(C) Individualized instruction (D) Collaborative projects

13. Which of the following is NOT a TLM?

(A) Computer (B) Timeline chart

(C) Teacher (D) Textbook

14. How is evaluation viewed in a constructive perspective?

(A) As a tool for judgement

(B) As a means of ranking students

(C) As a process of providing feedback and fostering growth

(D) As a way to reinforce traditional teaching methods

15. Formative evaluation takes place :

(A) At the end of instruction

(B) During instruction

(C) Before instruction begins

(D) Long after completion of instruction

16. What is the main goal of 'assessment as learning' ?

(A) To assign grades to students

(B) To support students' ongoing learning and development

(C) To measure students' memory

(D) To create competition among students

17. When observation of activities of a group is made by a member of the same group being observed, it is called :

(A) Participant observation

(B) Controlled observation

(C) Overt observation

(D) Incidental observation

18. The 'blueprint' of a test is prepared at _____ stage of the test construction.

(A) Planning

(B) Preparing

(C) Trying out

(D) Evaluation

19. Which of the following is a difference between teacher:made test and standardized test ?

(A) Preparation of blueprint

(B) Inclusion of objective type test items

(C) Fixation of norms

(D) Provision for negative marking for wrong answers

20. What is the primary purpose of using assignment as an assessment tool ?

(A) To evaluate students' understanding and application of course material

(B) To reduce workload of teachers

(C) To test students' memory

(D) To keep students engaged in study related activities

21. Which of the following is NOT a consideration in the construction of an achievement test ?

(A) Weightage assignment to different forms of test items

(B) Objectives of the test

(C) Content of learning

(D) Socio:economic condition of the examinees

22. What is the purpose of self:assessment ?

(A) To replace traditional assessment techniques

(B) To assess the learning achievement of classmate friends

(C) To enable students to reflect on their own learning and progress

(D) To lessen the burden of teachers' assessment work

23. Which of the following suggests that the test items should cover a representative sample of the content being assessed ?

(A) Reliability

(B) Validity

(C) Objectivity

(D) Usability

24. Which of the following guides construction of test items ?

(A) Ability of the students

(B) Quality of teaching in a school

(C) Test items available in the textbooks for practice by students

(D) Objectives of instruction

25. Which of the following is true for a particle undergoing uniform circular motion?

(A) The magnitude of the centripetal force is independent of the speed of the particle.

(B) The direction of the acceleration of the particle is always perpendicular to the direction of velocity.

(C) The magnitude of the acceleration of the particle is inversely proportional to its speed.

(D) The net force on the particle is zero.

26. According to Kepler's laws of planetary motion, the planets of the solar system revolve round the sun in elliptical orbits. The speed of a planet in its orbit has :

(A) the maximum value when it is farthest from the sun.

(B) a constant value at all points of the orbit.

(C) the minimum value when its distance from the sun is equal to the semimajor axis of the elliptical orbit.

(D) the maximum value when it is closest to the sun.

27. From Hooke's law of elasticity we can conclude that for a homogeneous isotropic material,

(A) strain is directly proportional to stress within elastic limit.

(B) Young's modulus is directly proportional to stress within elastic limit.

(C) Young's modulus is inversely proportional to stress within elastic limit.

(D) strain is independent of stress within elastic limit.

28. The sound wave produced by transverse vibration of a stretched string is :

(A) a transverse wave

(B) a longitudinal wave

(C) a superposition of transverse and longitudinal waves

(D) a wave which cannot propagate in air.

29. Which of the following optical devices can produce a real image of a real object ?

(A) Convex mirror

(B) Plane mirror

(C) Concave mirror

(D) Concave lens

30. An electric dipole is enclosed within a spherical region. The total electric flux over the surface of the sphere is :

(A) proportional to the square of the radius of the sphere

(B) proportional to the radius of the sphere

(C) proportional to the square root of the radius of the sphere

(D) zero

31. A transformer converts :

(A) a DC voltage to an AC voltage

(B) an AC voltage to an AC voltage of higher or lower value

(C) a DC voltage to a DC voltage of higher or lower value

(D) an AC voltage to a DC voltage of higher or lower value

32. A point particle having electric charge Q moves in a region where a uniform magnetic field exists. The force on the charged particle is :

(A) zero

(B) along the direction of the magnetic field

(C) perpendicular to the direction of the magnetic field

(D) opposite to the direction of the magnetic field

33. A particle P is thrown up vertically. After some time another particle Q is thrown up vertically. At a given instant of time, P falls down and Q still rises up. Which of the following is true at that instant ?

(A) The particle P has downward acceleration and Q has upward acceleration

(B) Both P and Q have upward acceleration

(C) Both P and Q have downward acceleration

(D) Both P and Q have zero acceleration

34. The escape velocity on earth is :

(A) directly proportional to the mass of the earth

(B) directly proportional to the square root of the mass of the earth

(C) directly proportional to the cube of the radius of the earth

(D) independent of the mass of the earth

35. One mole of an ideal gas undergoes a process in which its pressure remains constant. Which of the following is true for the gas ?

(A) The product of the pressure and volume always remain constant irrespective of the temperature

(B) The ratio of the temperature to volume remains constant

(C) The product of the volume and temperature remains constant

(D) The product of pressure, volume and temperature remains constant

36. A source produces sound waves of a definite frequency and a listener, located at a distance, hears the sound. The frequency of sound heard by the listener will be more than the frequency of sound produced by the source if :

(A) the source moves towards the listener

(B) the source moves away from the listener

(C) the listener moves away from the source

(D) both the source and the listener move away from each other

37. Total internal reflection can occur when light, travelling in a transparent medium, is incident on :

(A) another transparent medium of higher refractive index

(B) another transparent medium of lower refractive index

(C) the surface of a convex mirror

(D) the surface of a concave mirror

38. The magnitudes of the electrostatic field and the electrostatic potential at a given point, due to a point charge, are E and V respectively. If the distance between the charge and the point of observation is doubled, the magnitudes of the electrostatic field and the electrostatic potential at the point of observation become respectively :

(A) $2E, 4V$

(B) $\frac{E}{2}, \frac{V}{2}$

(C) $\frac{E}{4}, \frac{V}{2}$

(D) $\sqrt{2}E, V/\sqrt{2}$

39. Kilowatt-hour is an unit of :

(A) electric potential difference

(B) electrical energy

(C) electric power

(D) average power consumption by an electric device

40. The SI unit of mutual inductance is :

(A) weber

(B) hertz

(C) tesla

(D) henry

41. Which of the following is true for a particle executing simple harmonic motion?

(A) Its kinetic energy is the maximum at the equilibrium position

(B) Its kinetic energy is the minimum at the equilibrium position

(C) Its potential energy is the maximum at the equilibrium position

(D) The magnitude of the restoring force on the particle is the maximum at the equilibrium position

42. A solid homogeneous sphere floats in water with two thirds of it's volume submerged. The specific gravity of the material of the solid is :

(A) 1/3

(B) 3/4

(C) 2/3

(D) 3/5

43. At normal temperature and pressure, the speed of sound in a gas :

(A) is independent of its density

(B) is directly proportional to its density

(C) is inversely proportional to its density

(D) is inversely proportional to the square root of its density

44. The image of an object formed on the retina of the human eye is :

(A) virtual, erect and diminished

(B) real, erect and diminished

(C) real, inverted and diminished

(D) virtual, inverted and diminished

45. The capacitance of a parallel plate capacitor :

(A) is independent of the area of the plate

(B) is directly proportional to the separation between the plates

(C) is inversely proportional to the area of the plate

(D) is inversely proportional to the separation between the plates

46. A straight conducting wire of uniform cross section is doubled on itself. Its electrical resistance :

(A) is doubled

(B) is reduced to half of its initial value

(C) is reduced to one fourth of its initial value

(D) remains unchanged

47. In an AC circuit containing a resistor and a capacitor, the reactance of the capacitor :

(A) depends on the value of the capacitance but is independent of the frequency of the AC

(B) is inversely proportional to the frequency of the AC

(C) is directly proportional to the frequency of the AC

(D) is directly proportional to the square root of the frequency of the AC

48. A particle, starting from rest, moves along a straight line with constant acceleration. A graph is plotted with time along the X-axis and the speed of the particle along the Y-axis. The area under the speed versus time graph, up to a given instant of time, gives :

(A) the total work done by the particle during the time interval

(B) the final speed attained by the particle at the given instant of time

(C) the acceleration of the particle at the instant of time

(D) the total distance travelled by the particle up to the instant of time

49. An ideal fluid flows at a constant rate through a tube of uniform cross section, when its ends are maintained at a constant pressure difference. Suppose the internal radius of the tube is reduced to half of its value. In order to keep the rate of flow of the fluid unchanged, the pressure difference between the ends of the pipe has to be :

(A) increased two times

(B) increased four times

(C) increased eight times

(D) increased sixteen times

50. One mole of oxygen gas at NTP is equal to :

(A) 6.023×10^{23} molecules of oxygen

(B) 6.023×10^{23} atoms of oxygen

(C) 16 gm of oxygen

(D) 8 gm of oxygen

51. Nitrogen has the electronic configuration of $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$ as per :

(A) Pauli's exclusion principle (B) Aufbau principle

(C) Hund's rule of multiplicity (D) Uncertainty principle

52. The angular momentum of an electron is zero. In which orbital may it be present?

(A) $2s$ (B) $2p$

(C) $3d$ (D) $4f$

53. Among the halogens, the correct order of electron gain enthalpy is :

(A) F > Cl > Br > I (B) F < Cl < Br < I

(C) F < Cl > Br > I (D) F < Cl, Br > I

54. The electronic configuration of elements A, B, C are given below :

$A = 1s^2 2s^2 2p^6$, $B = 1s^2 2s^2 2p^6 3s^2 3p^3$, $C = 1s^2 2s^2 2p^6 3s^2 3p^5$

The bond between B and C will be

(A) Ionic (B) Covalent

(C) Co-ordinate covalent (D) Metallic

55. Which of the following molecules is linear?

(A) CO_2 (B) CCl_4

(C) H_2O (D) NH_3

56. Which of the following properties of water can be used to explain the spherical shape of rain droplets?

(A) Viscosity (B) Surface tension

(C) Fugacity (D) Fluidity

57. Real gases behave ideally at :

(A) low pressure and high temperature

(B) high pressure and high temperature

(C) low pressure and low temperature

(D) high pressure and low temperature

58. Which of the following is not a redox reaction?

(A) $CuO + H_2 \rightarrow Cu + H_2O$

(B) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(C) $2K + F_2 \rightarrow 2KF$

(D) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

59. For the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3 + 21KCal$ formation ammonia is favoured by:

(A) high pressure and low temperature

(B) low pressure and high temperature

(C) low temperature only

(D) low pressure only

60. For the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(A) $K_P = K_C$

(B) $K_P < K_C$

(C) $K_P > K_C$

(D) $K_P = \frac{1}{K_C}$

61. The pH of a 0.001M NaOH solution is :

(A) 3

(B) 11

(C) 7

(D) 14

62. The impurities associated with an ore after mining is called :

(A) Flux

(B) Slag

(C) Gangue

(D) Minerals

63. Which one of the following acts as a reducing agent in blast furnace in extraction of Iron?

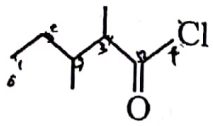
(A) C

(B) CO

(C) CO_2

(D) SiO_2

64. The IUPAC name of the compound :



(A) 2,3-dimethyl pentanoyl chloride

(B) 2,4-dimethyl pentanoyl chloride

(C) 1-chloro-1-oxo-2,3-dimethyl pentane

(D) 2-ethyl-3-methylbutanoyl chloride

65. Consider the following carbocations :

(i) $Cl_3\overset{\oplus}{C}$ (ii) $Cl_2\overset{\oplus}{C}H$ (iii) $Cl\overset{\oplus}{C}H_2$ (iv) $\overset{\oplus}{C}H_3$

The order of stability of the cations is

(A) (iv) < (i) < (ii) < (iii) (B) (i) < (ii) < (iii) < (iv)

(C) (iv) < (i) < (iii) < (ii) (D) (iv) < (ii) < (i) < (iii)

66. Which of the following species is not an electrophile?

(A) $Cl^{\oplus}$ (B) BH_3

(C) $H_3\overset{\oplus}{O}$ (D) $\overset{\oplus}{N}O_2$

67. Which of the following is a substitution reaction?

(A) $NH_4CNO \xrightarrow{\Delta} NH_2CONH_2$

(B) $\overset{\ominus}{O}H + CHCl_3 \longrightarrow \ddot{C}Cl_2 + H_2O + \overset{\ominus}{Cl}$

(C) $CH_4 + Cl_2 \longrightarrow CH_3Cl + HCl$

(D) Cis-2-butene $\overset{h\nu}{\rightleftharpoons}$ trans-2-butene

68. When CH_3COONa is heated with sodalime, the gas formed is :

(A) C_2H_2 (B) CH_4

(C) C_2H_6 (D) C_2H_4

69. In the following sequence of reaction, the product 'C' is :

$$CH_3-\underset{\underset{Br}{|}}{CH}-CH_2-CH_3 \xrightarrow{\text{alc. KOH}} A \xrightarrow{O_3} B \xrightarrow[\Delta]{Zn} C$$

(A) CH_3CHO (B) CH_3COCH_3

(C) $CH_3-CH=CH_2$ (D) CH_4

70. Which of the following will decolourise alkaline $KMnO_4$?

(A) C_3H_8 (B) C_2H_4

(C) CH_4 (D) CCl_4

71. Which of the following is not an aromatic species?

(A)  (B) 

(C)  (D) 

72. $C_2H_5—Br \xrightarrow[\text{Dry Ether}]{Na} C_4H_{10}$

The above reaction is called :

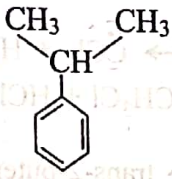
(A) Wurtz reaction (B) Fittig reaction

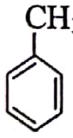
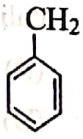
(C) Wurtz-Fitting reaction (D) Williamson's synthesis

73. The product 'A' in the reaction

 $+ CH_3–CH_2–CH_2–Cl \xrightarrow[\Delta]{\text{Anh. } AlCl_3} A$

is :

(A)  (B) 

(C)  (D) 

74. A metallic carbide on treatment with water gives a colourless gas with garlic odour. The gas formed gives a precipitate with ammoniacal $AgNO_3$ solution. The gas formed is :

(A) CH_4 (B) C_2H_4

(C) C_2H_2 (D) C_2H_6

75. A class has 175 students. Out of these, 100 students opted for Mathematics, 70 students for Physics, 40 students for Chemistry, 30 students for both Mathematics and Physics, 28 students for both Mathematics and Chemistry, 23 students for both Physics and Chemistry, 18 students for Mathematics, Physics and Chemistry. Then how many students in the class opted for Mathematics only ?

(A) 60
(B) 48
(C) 38
(D) 26

76. For the sets P, Q and R, consider the following :

(1) $P - Q = P - (P \cap Q)$.

(2) $P = (P \cap Q) \cup (P - Q)$.

(3) $P - (Q \cup R) = (P - Q) \cup (P - R)$.

Choose the correct option.

(A) Only (2) is true.
(B) Only (1) and (2) are true.
(C) Only (1) and (3) are true.
(D) (1), (2) and (3) are true.

77. On the set $X = \{1,2,3\}$, what is the number of relations containing (1,2) and (1,3), which are reflexive and symmetric, but not transitive ?

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

78. Let P = [–1,1] = Q and S = $[0, \infty)$. Consider the following relations :

(1) The relation $R_1 = \{(x, y) \in P \times Q : x^2 + y^2 = 1\}$ is a function from P into Q.

(2) The relation $R_2 = \{(x, y) \in P \times S : x^2 + y^2 = 1\}$ is a function from P into S.

Pick out the correct option.

(A) Only (1) is true.
(B) Only (2) is true.
(C) Both (1) and (2) are true.
(D) Both (1) and (2) are false.

79. Which one of the following is true for the number $\frac{441}{2^2 \times 5^3 \times 7}$?

(A) It has a terminating decimal expansion.
(B) It has a non-terminating, non-repeating decimal expansion.
(C) It has a non-terminating, but repeating decimal expansion.
(D) It has a terminating decimal expansion after two places of decimal.

80. Which one of the following is the solution set of the inequality $|2x+3|>5$?

(A) $(-\infty,-4)$ (B) $(1,\infty)$

(C) $(-\infty,-4)\cup(1,\infty)$ (D) $(-\infty,-1)\cup(4,\infty)$

81. If α, β are roots of the equation: $ax^2+bx+c=0$ and $pn=\alpha^n+\beta^n$ $(n\in\mathbb{N})$, then which one of the following is the value of $ap_{n+1}+bp_n+cp_{n-1}$?

(A) 0 (B) 1

(C) $a+b+c$ (D) $-(a+b+c)$

82. If the pair of linear equations : $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ (a_1,b_1,c_1,a_2,b_2,c_2 are real numbers and a_1,b_1,a_2,b_2 are non-zero real numbers) represent parallel lines, then which one of the following is true ?

(A) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$ (B) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$

(C) $\frac{a_1}{a_2}=\frac{b_1}{b_2}$ (D) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$

83. $\lim\limits_{x\to\infty}\frac{(x+1)^{10}+(x+2)^{10}+\ldots+(x+100)^{10}}{x^{10}+10^{10}}$ is equal to :

(A) 1 (B) 10

(C) 10^2 (D) 10^{10}

84. If the function f defined on $\mathbb{R}$ by $f(x)=\begin{cases}ax^2+b, & b\neq0, x\leq1\\ bx^2+ax+c, & x>1\end{cases}$ is continuous and differentiable at $x=1$, then which one of the following is true ?

(A) $a=2b, c=0$ (B) $a=b, c\in\mathbb{R}$

(C) $a=b, c=0$ (D) $2a=b, c\neq0$

85. For the function $f(x)=(x+2)e^{-x}$ $(x\in\mathbb{R})$, which one of the following is true ?

(A) f decreases for all $x\in\mathbb{R}$.

(B) f decreases in $(-\infty,-1)$ and increases in $(-1,\infty)$.

(C) f increases for all $x\in\mathbb{R}$.

(D) f increases in $(-\infty,-1)$ and decreases in $(-1,\infty)$.

86. Let the sum of three numbers in Geometric Progression be 14. If 1 is added to the first and second number and 1 is subtracted from the third number, then the new numbers are in Arithmetic Progression. The smallest of these numbers is :

(A) 2 (B) 4

(C) 6 (D) 8

87. The sum of the series : $1+\frac{2x}{1!}+\frac{3x^2}{2!}+\frac{4x^3}{3!}+\ldots$ is :

(A) e^{x^2} (B) xe^x

(C) $(x+1)\,e^x$ (D) $1+xe^x$

88. P is a point on the line segment joining the points (2,2,1) and (5,1,−2). If x-coordinate of the point P is 4, then its z-coordinate is :

(A) −1 (B) 0

(C) 1 (D) 2

89. If the plane $x+2y-z=4$ cuts the sphere $x^2+y^2+z^2-x+z-2=0$ in a circle, then the radius of the circle is :

(A) 3 (B) 2

(C) $\sqrt{2}$ (D) 1

90. If the area of a triangle with vertices $(-3,0)$, $(3,0)$ and $(0,k)$ is 9 sq. units, then the value of k is :

(A) 2 (B) 3

(C) -5 (D) -4

91. In what ratio is the line segment joining the points $(-6,15)$ and $(3,5)$ is divided by the y-axis internally ?

(A) 2 : 3 (B) 3 : 2

(C) 2 : 1 (D) 1 : 2

92. If a circle touches the x-axis and also touches the circle with center (0,3) and radius 2, then the locus of the center of the circle is :

(A) a hyperbola (B) a parabola

(C) an ellipse (D) a circle

93. Consider the following relations for two events E and F :

(1) Prob (E ∩ F) ≥ Prob (E) + Prob (F) −1.

(2) Prob (E ∪ F) = Prob (E) + Prob (F) + Prob (E ∩ F).

(3) Prob (E ∪ F) ≤ Prob (E) + Prob (F)

Which of the above relation(s) is/are correct ?

(A) (1) only (B) (2) only

(C) (1) and (3) only (D) (1), (2) and (3)

94. In an experiment, positive and negative values are equally likely to occur. The probability of obtaining at most one negative value in 5 trials is :

(A) $\frac{1}{32}$ (B) $\frac{1}{16}$

(C) $\frac{3}{32}$ (D) $\frac{3}{16}$

95. What is the variance of the first 10 natural numbers ?

(A) 7 (B) 7.25

(C) 8 (D) 8.25

96. If the Mean and the Mode of a data sample are 35 and 30, then its Median is :

(A) 19 (B) 26

(C) 33.33 (D) 75

97. When the length of the shadow of a tree is $\sqrt{3}$ times the height of the tree, what is the angle of elevation of the Sun ?

(A) 30° (B) 45°

(C) 60° (D) 90°

98. If $0 \leq \theta < 2\pi$, the solution of the trigonometry equation: $\sin(\theta) + \cos(\theta) = \sqrt{2}$ is :

(A) $\frac{\pi}{4}$ (B) π

(C) $\frac{3\pi}{4}$ (D) $\frac{7\pi}{4}$

99. The lateral surface area of a cone is $1\frac{1}{3}$ times larger than its base area. If the height of the cone is 7 cm, then the surface area of the cone is :

(A) 135 π cm² (B) 138 π cm²

(C) 142 π cm² (D) 147 π cm²

100. A horse is grazing in a field. It is tied to a pole with a rope of length 6 metres. The horse moves from a point P to a point Q making an arch with an angle of 70° . The area of the sector grazed by the horse is :

(A) 20.99 sq. metres. (B) 21.99 sq. metres.

(C) 22.99 sq. metres. (D) 23.99 sq. metres.