CMMC-2020

STD XI – MATHS, PHYSICS, CHEMISTRY | CBSE

Multiple Choice Questions | Number of questions: 120 | Max Marks: 120 | Time: 120 Minutes

MATHEMATICS (40 x 1 = 40 marks)

1) The set B = $\{x: x \text{ is a natural number less than } 6\}$ in roster form is …Y…. .
Here, Y refers to

A) {0,1,2,3,4,5} B) {1,2,3,4,5}
C) {0,1,2,3,4,5,6} D) {1,2,3,4,5,6}

2) The set C=
$\{x: x \text{ is a two} - \text{digit natural number such that the sum of its digits in } 8\ \}$
in roster form is

A) {17,26,35,44,53,62,71,80} B) {17,26,35,44,53,62,80}
C) {08,17,26,35,44,53,62,80} D) {17,26,35,53,62,80}

3) If y= $\{x: x$ is a positive factor of the number $2^{p-1}(2^p - 1)$, where 2^p- 1 is a prime number}
Then Y can be represented in roster form as

A) {2} B) {1,2}
C) $\{1, 2, 2^2 \ldots . 2^{p-1}\}$ D) $\{1, 2, 2^2, 2^3 \ldots . 2^{p-1}(2^p - 1)\}$

4) If A = the set of Letters in 'ALLOY' and B= the set of letters in 'LOYAL', then A and B are … X …. Here, X refers to

A) Equal B) Un equal C) Disjoint D) None of these

5) If A = {1,2,3,4,5}, B= {2,4,6} and C= {3,4,6} then $(A \cup B) \cap C$ *is*

A) {3,4,6} B) {1,2,3} C) {1,4,3} D) Non of these

6) If P= {1,2}, *then* $P \times P \times P =$ {(1,1,1), (1,1,2}, (1,2,1)(2,1,2), (2,2,1), (2,2,2).
The ordered triplet missing in $P \times P \times P$ *are*

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

7) Let A={1,2}, $B = \{1,2,3,4\}, C = (\{5,6\}$ *and* $D = \{5,6,7,8\}$. Then, which of the following is /are true?

(i) $A \times B = A \times C$ (ii) $A \times C) \subset (B \times D)$ (iii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

A) I and II are true
B) Only II is true
C) Only III is true
D) II and III are true

8) Let A={3,5}, $B = \{7,11\}$ *and* $R = \{(a, b): a \in A, b \in B, a + b \text{ is odd}\}$ then, R in Roster form, is

A) A) {(3,7), (5,11)} B) {(3,11), (5,7)}
C) { } D) None of these

9) The domain of the real function $f(x) = \frac{1}{\sqrt{4-x^2}}$ is

A) The set of all real numbers B) The set of all positive real numbers
C) $(-2,2)$ D) $(-2,2)$

10) If f(x) $= x^3 - \frac{1}{x^3}$, *then* $f(x) + f\left(\frac{1}{x}\right)$ is equal to

A) $2x^3$ B) $\frac{2}{x^3}$ C) 0 D) 1

11) The degree measure of the angle subtended at the cetre of a circle of radius 100 cm by an arc of Length 22cm is $\left[use\ \pi = \frac{22}{7}\right]$

A) $12°36'$ B) $22°36'$ C) $10°30'$ D)$12°30'$

12) If in two circles, arcs of the same length subtend angles $60°$ *and* $75°$ at the centre, then the ratio of their radii is

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

13) If $\frac{\cos A}{3} = \frac{\cos B}{4} = \frac{1}{5}, \frac{\pi}{2} < A < 0, -\frac{\pi}{2} < B < 0$ then value of 2 sin A + 4 sin B is

A) 4 B) -2 C) -4 D) 0

14) If $\text{cosec}\, x = -\frac{2}{\sqrt{3}}$ *and lies in quadrant IV, then the value of* $\tan x$ *is*

a)$\sqrt{3}$ b) -$\sqrt{3}$ c)$\frac{1}{\sqrt{3}}$ d) $-\frac{1}{\sqrt{3}}$

15) $\frac{\sin x - \sin y}{\cos x + \cos y}$ *is equal to*

A) $\frac{\tan x+y}{2}$ B) $\frac{\sin x+y}{2}$ C) $\frac{\tan x-y}{2}$ D) $\frac{\sin x-y}{2}$

16) For any natural number n, $x^n - y^n$ is divisible by .. A.., where *and* y *are any integers with* $x \neq y$. Here, A refers to

A) $(x-y)^3$ B) $(x-y)$ C) $(x-y)^4$ D) None of these

17) **Statement I** $1+2+3+ \ldots +n < \frac{1}{8}(2n+1)^2, n \in N$

Statement II $\mathbf{n(n+1)(n+5)}$ ***is a multiple of*** $\mathbf{3}$, $n \in N$

A) Only statement I is true B) Only statement II is true

C) Both statements are true D) Both statements are false

18) For all n$\in N, 32^{n+2} - 8n - 9$ *is divisible by*

I. 4 II. 6 III. 8 IV.10

A) Only I is true B) Only IV is true

C) I and III are true D) All are true

19) For all n$\in N, x^{2n} - y^{2n}$ *is divisible by*

A) $(x+y)$ B) $(x+y)^3$ C) $(x+2y)$ D) $(2x+y)$

20) If $z_1 = 2 + 3i$ *and* $z_2 = 3 - 2i$, *then* $z_1 - z_2$ *is equal to*

A) -1+5i B) 5-I C) i+5 D) None of these

21) If $z = 5i\left(-\frac{3}{5}i\right)$, *then* z *is equal to*

A) $0 + 3i$ B) $3 + 0i$ C) $3 - 0i$ D) $-3 + 0i$

22) *If* $z = i^9+$, *then* z *is equal to*

A) $0 + 0i$ B) $1+0i$ C) $0 + i$ D) $1 + 2i$

23) *If* $z = i^{-39}$, *then simplest form of* z *is equal to*

A) $1+0i$ B) $0+i$ C) $0 + 0i$ D) $1 + i$

24) *The value of* $(1+i)^8(1-i)^8$*is*

A) 16 B)-16 C) 32 D) -32

25) *If* $\left(\frac{1+i}{1-i}\right)^m = 1$, *then least positive integral value of* m *is*

A) 4 B) 0 C) 2 D) 1

26) *The set of real* x *satisfying the inequality* $\frac{5-2x}{3} \leq \frac{x}{6} - 5$ *is*

A) $(-\infty, 8)$ B) $(8, \infty)$ C) $(8, \infty)$ D) $(-\infty, 8)$

27) Ravi obtained 70 and 75 marks in first two un it tests. Then, the minimum marks he should get in the third test to have an average of at least 60 marks, are

A) 45 B) 35 C) 25 D) None of these

28) If -3x +17< -13, *then*

A) $x \in (10, \infty)$ B) $x \in (-\infty, 10)$

C) $10x \in (-10, 10)$ D) $x \in (-\infty, -10) \cup (10, \infty)$

29) Which of the following is the solution set of the inequality $\frac{x}{4} < \frac{5x-2}{3} - \frac{7x-3}{5}$?

A) $(4, \infty)$ B) $(-\infty, 4)$ C) $(4, \infty)$ D) $(-\infty, 4)$

30) The solution set of the inequality $4x + 3 < 5x + 7 \forall x \in R$ *is*

A) $(-4, \infty)$ B) $(-4, \infty)$ C) $(4, \infty)$ D) $(4, \infty)$

31) Mohan has 3 pants and 2 shirts. The number of different pairs of a pant and shirt he can wear are

A) 5 B) 6 C) 7 D) None of these

32) The number of ways in which 3 prizes can be distributed to 4 children, so that no child gets all the three prizes, are

A) 64 B) 62 C) 60 D) Non of these

33) Consider the following statements

Statement I If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$, *then x is equal to* 100

Statement II If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$, *then x is equal to* 56

Which of the above statement (s) is/arer true?

A) Only I

B) Only II

C) Both I and II

D) Neither I nor II

34) The total number of 9-digit numbers which have all different digits is

A)10! B) 9! C) 9× 9! D) 10× 10!

35) The number of words with or without meaning which can be made using all the letters of the word AGAIN are … A … and if these words are written as in dictionary, then the

50th word is …B… .

Here, A and B refers to

A) 60, NAAIG B) 60, NAAGI C) 120, NAAIG D) 120, NAAGI

36) By using binomial theorem, $(x + 2)^6$ *is equal to*

A) $x^6 + 12x^6 + 60x^4 + 150x^3 + 230x^2 + 192x + 64$

B) $x^5 + 12x^6 + 60x^5 + 160x^4 + 240x^3 + 192x^2 + 62x$

C) $x^6 + 12x^5 + 60x^4 + 160x^3 + 240x^2 + 192x + 64$

D) None of the above

37) Notation from of $(a + b)^n$ *is*

A) $\sum_{k=0}^{n} {}^{n}C_k a^{n+k} b^k$

B) $\sum_{k=0}^{n} {}^{n}C_k a^{n-k} b^k$

C) $\sum_{k=0}^{n} {}^{n}C_k b^{n+k} a^k$

D) None of these

38) In every term, the sum of indices of a and b in the expansion of $(a + b)^n$ *is*

A) n B) n+1 C) n+2 D) n-1

39) *If* $x \neq 0$, *then* $\left(x^2 \frac{3}{x}\right)^4$ *is equal to*

A) $x^8 + 12x^5 + \frac{108}{x} + \frac{81}{x^4}$ B) $x^8 + 12x^5 + 54x^3 \frac{180}{x} + \frac{81}{x^3}$

C) $x^8 + 12x^5 + 54\, x^2 \frac{108}{x} + \frac{81}{x^4}$ D) None of the above

40) The positive value of $m$for which the coefficient of x^2 *in the expansion* $(1+x)^m$ *is* 6, *is*

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

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PHYSICS (40 x 1 = 40 marks)

1) Acceleration due to gravity is always ....A.....while .....B.....can be attractive or repulsive.

Here, A and B refer to

A) Repulsive, Tension B) Repulsive, Friction

C) Attractive, electromagnetic force D) Repulsive, Contact force

2) Electric field is manifest itself in atmosphere, where

A) Atoms are non-ionised

B) Atoms are ionised and that leads to lightening

C) Atoms are ionised

D) Atoms are electrically neutral

3) For motion under an external conservative force, total ...A...is constant. Here, A refers to

A) Kinetic energy B) Mechanical energy

C) Potential energy D) Gravitational energy

4) Name the device used for measuring the mass of atoms and molecules

A) Spectrograph B) Photograph

C) Cryptograph D) Radiograph

5) If 3.8×10^{-6} is added to 4.2×10^{-5} giving due regard to significant figures, then the result will be

A) 4.58×10^{-5} B) 4.6×10^{-5}

C) 45×10^{-5} D) None of these

6) **Statement I** Average velocity tells us how fast an object has been moving over a given time interval.

Statement II Instantaneous velocity tells us how fast an object moves at different instants of time during a particular interval of time

Choose the correct option

A) Both the statements are correct

B) Statement I is correct

C) Statement II is correct

D) Neither statement I nor II is correct

7) The velocity of a particle is given as $v(t) = 3t^3 - 2t^2$ The instantaneous acceleration of the particle at t= 1 s is

A) 5 Units B) 4 Units

C) 1 Unit 4) None of these

8) The displacement of a particle is given by $x = (t-2)^2$, where x is in the particle in first 4s is

A) 8 m
B) 4m
C) 12m
D) 16m

9) The component of vector A $= a_x\hat{\imath} + a_y\hat{\jmath} + a_z\,\hat{k}$ along the direction of $\hat{\imath} - \hat{\jmath}$ is

A) $a_x - a_y + a_z$
B) $a_x - a_y$
C) $(a_x - a_y)/\sqrt{2}$
D) $a_x + a_y + a_z$

10) At what point of a projectile motion, acceleration and velocity are perpendicular to each other?

A) At the point of projection
B) At the point of drop
C) At the top most point
D) Anywhere between the point of projection and top most points

11) A pellet of mass 1 g is moving with an angular velocity of 1 rad s^{-1} along a circle of radius 1 m the centrifugal force is

A) 0.1 dyne
B) 12 dyne
C) 10 dyne
D) 100 dyne

12) A ball is travelling with uniform translator motion. This means that

A) It is a rest
B) The patch can be straight line or circular and the ball travels with uniform speed
C) All parts of the ball have the same velocity (magnitude and direction) and the velocity is constant
D) The centre of the ball moves with constant velocity and the ball spins about its centre uniformly.

13) A person of mass 50 kg stands on a weighting scale on a lift. If the lift is descending with a downward acceleration of $9m/s^2$, what would be the reading of the weighting scale ? $g = 10\,\frac{m}{s^2}$

A) 5 kg
B) 4 kg
C) 10 kg
D) 14kg

14) Find the angle between force F$=3\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$ unit and displacement d$= 5\hat{\imath} + 4\hat{\jmath} + 3\hat{k})$ unit

A) $\cos^{-1}(0.49)$
B) $\cos^{-1}(0.32)$
C) $\cos^{-1}(0.60)$
D) $\cos^{-1}(0.90)$

15) Work done can be
A) Positive
B) Negative
C) both (a) and (b)
D) Neither (a) nor (b)

16) The radius of gyration of a body about an axis at a distance 6cm from its centre of mass is 10 cm. Then, its radius of gyration about a parallel axis through its centre of mass will be
A) 80 cm
18) 8 cm
C) 0.8 cm
D) 80 cm

17) What is moment of inertia in terms of angular momentum (L) and kinetic energy (K)?
A) $\frac{L^2}{K}$
B) $\frac{L^2}{2K}$
C) $\frac{L}{2K^2}$
D) $\frac{L}{2K}$

18) The disc is rolling on the inclined plane, what is the ratio of its rotational KE to the total KE?
A) 1:3
B) 3:1
C) 1:2
D) 2:1

19) Consider the uniform square plate of side and mass m. The moment of inertia of this plate about an axis perpendicular to its plane and passing through one of its corner is
A) $5/6\ ma^2$
B) $1/2\ ma^2$
C) $7/12\ ma^2$
D) $2/3\ ma^2$

20) Two balls, each of radius R, equal mass and density are placed in contact, then the force of gravitation between them is proportional to
A) $F \propto \frac{1}{R^2}$
B) $F \propto R$
C) $F \propto R^4$
D) $F \propto \frac{1}{R}$

21) The radius of the Earth is R. The height of a point vertically above the Earth's surface at which acceleration due to gravity becomes 1% of its value at the surface is
A) 8 R
B) 9 R
C) 10 R
D) 20 R

22) The escape velocity of a body from the Earth is v_e If the radius of Earth contracts to 1/4 th of its value, keeping the mass of the Earth constant, the escape velocity will be
A) Doubled
B) Halved
C) Tripled
D) Unaltered

23) Two spheres of masses m and M are situated in air and the gravitational force between them is F. The space around the masses is now filled with a liquid of specific gravity 3.
The gravitational force will now be

A) F
B)F/3
C) F/9
D) 3F

24) Identical springs of steel and copper are equally stretched. On which, more work will have to be done?
A) $W_{steel} < W_{copper}$
B) $W_{steel} > W_{copper}$
C) $W_{steel} = W_{copper}$
D) Both (b) and (c)

25) Write Copper, Steel, Glass and Rubber in order of increasing coefficient of elasticity.
A) Steel, Rubber, Copper, Glass
B) Rubber, Copper, Steel, Glass
C) Rubber, Glass, Steel, Copper
D) Rubber, Glass, Copper, Steel

26) The energy stored per unit volume in copper wire, which produces longitudinal strain of 0.1% is (Young's modulus $=1.1 \times 10^{11} Nm^{-2}$)
A) $11 \times 10^3 Jm^{-3}$
B) $5.5 \times 10^3 Jm^{-3}$
C) $5.5 \times 10^4 Jm^{-3}$
D) $11 \times 10^4 Jm^{-3}$

27) The top surface of an incompressible liquid is open to the atmosphere. The pressure at a depth h_1 below the surface is p_1. How does the pressure p_2 at depth $h_2 = 2h_1$ compare with p_1?
A) $p_2 > 2p_1$
B) $p_2 = 2p_1$
C) $p_2 < 2p_1$
D) $p_2 = p_1$

28) The pressure energy per unit volume of the water dam is
A) $Ahpg$
B) hpg
C) $1/2Ahpg$
D) $1/2pgh^2$

29) The temperature scales A and B are related by $\frac{A-42}{110} = \frac{B-72}{220}$. At which temperature two scales have the same reading?
A) $-42°C$
B) $-72°C$
C) $12°C$
D) $40°C$

30) A brass rod length 500 mm and diameter 3mm is joined to a steel rod of same length and diameter at 50°C. If the coefficients of linear expansion of brass and steel are 2.5 x $10^{-5°}$ c^{-1} and 1.25 x $10^{-5°}$ c^{-1} then change in length of the combined rod at 200° C is
A) 2.4 mm
B) 2.8 mm
C) 3.2 mm
D) 3.6 mm

31) A composite rod made of copper ($\propto = 1.8 \times 10^{-5} K^{-1}$ and steel ($\propto = 1.2 \times 10^{-5} K^{-1}$ is heated. Then,
A) It bends with steel on concave side
B) It bends with copper on concave side
C) It does not expand
D) Data is insufficient

32) Certain amount of heat is given to 100 g of copper to increase its temperature by 21° C. If the same amount of heat is given to 50 g water, then the rise in its temperature is (specific heat capacity of copper $= 400J - kg^{-1}K^{-1}$ and that of water $= 4200J - kg^{-1}K^{-1}$

A) 4° C B) 5.2° C
C) 8° C D) 6° C

33) **Assertion** (A) If the temperature of two systems is not same it means that they must not be in thermodynamic equilibrium.

Reason (R) If the temperature of two systems is not same it means that they must be in thermal equilibrium.

A) A and R both are correct and R is the correct explanation of A
B) A and R both are correct but R is not the correct explanation of A
C) A is correct but R is incorrect
D) A is incorrect and R is correct

34) For isobaric process for one mole of an ideal gas

A) $p\left(\frac{\Delta V}{\Delta T}\right)_p = C_p - C_v$ B) $p\left(\frac{\Delta V}{\Delta P}\right)_p = R$
C) $V\left(\frac{\Delta V}{\Delta T}\right)_p = C_p - C_v$ D) $V\left(\frac{\Delta V}{\Delta T}\right)_p = R$

35) Which of the following is true in the case of an adiabatic process, where $\gamma = C_p/C_v$?

A) $p^{1-\gamma}T^{\gamma}$= constant B) $pv^{T\gamma} =$ constant
C) $p^{T\gamma} =$ constant D) $p^{\gamma}T =$ constant

36) Ten moles of an ideal gas at constant temperature 500 K is compressed from 50 L to 5L. Work done in the process is (given, R=8.311 $J - mol^{-1} - K^{-1}$

A) -1.2 X 10^4 J B) -2.4 X 10^4 J
C) -4.8 X 10^4 J D) -9.6 X 10^4 J

37) A perfect gas at 27°C is heated at constant pressure so as to double its volume. The increase in temperature of a gas will be

A) 300° C B) 54°
C) 327° D) 600°

38) At constant pressure, which of the following is true for an ideal gas?
(Where, $\rho =$ density of the gas and $v=$ rms speed off the gas)

A) $v\alpha\sqrt{p}$ B) $v\alpha\frac{1}{p}$
C) $v\alpha p$ D $v\alpha\frac{1}{\sqrt{p}}$

39) The displacement of an object attached to S spring and executing simple harmonic motion is given by $x = 2x\ 10^{-2}\ \cos\pi t\ \ m$. The time at which the maximum speed first occurs is

A) 0.5 s. B) 0.75 s.
C) 0.125 s D) 0.25 s

40) In a progressive way along x direction, at a particular location the particles of the

medium are executing

A) Oscillatory motion B) Rectilinear motion

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CHEMISTRY (40 X 1 = 40 MARKS)

1. Hydrogen and oxygen are gases whereas compound formed by their combination i.e., water is a liquid. It is interesting to note that
   1. hydrogen burns with a ...A... sound.
   2. oxygen is a ...B... of combustion.
   3. water is used as a ...C....

   Here, A, B and C refer to
   A. A ---> pop, B --> supporter, C --> fire extinguisher
   B. A --> hush, B --> non-supporter, C --> propellent
   C. A --> laughter, B -->supporter, C --> solvent
   D. A --> dashing, B --> non-supporter, C --> fire extinguisher
2. Of the following substances, the greatest density is of
   A. 1000 g of water at 4 ºC
   B. 100.0 cm^3 of chloroform weighing 198.9 g
   C. a 10.0 cm^3 piece of wood weighing 7.72 g
   D. an ethyl alcohol-water mixture of density 0.83 g/cm^3
3. The least count of an instrument is 0.01 cm. Taking all precautions, the most possible error in the measurement can be
   A. 0.005 cm
   B. 0.01 cm
   C. 0.0001 cm
   D. 0.1 cm
4. If the molecular weights of $Na_2S_2O_3$ and I_2 are M_1 and M_2 respectively, then what will be the equivalent weight of $Na_2S_2O_3$ and I_2 in the following reaction?

$$2S_2O_3^{2-}{}^{2-} + I_2 \text{ -----> } S_4O_6^{2-} + 2I^-$$

   A. M_1, M_2
   B. $M_1, M_2/2$
   C. $2M_1, M_2$
   D. $M_1, 2M_2$
5. Given, that the abundances of isotopes ^{54}Fe, ^{56}Fe and ^{57}Fe are 5%, 90% and 5% respectively, the atomic mass of Fe is
   A. 55.85
   B. 55.95
   C. 55.75
   D. 56.05

6. An aromatic hydrocarbon with empirical formula C_5H_4 on treatment with concentrated H_2SO_4 gave a monosulphonic acid, 0.104 g of the acid required 10 mL of $\frac{N}{20}$ NaOH for complete neutralisation. The molecular formula of hydrocarbon is

   A. C_5H_4 B. $C_{10}H_8$ C. $C_{15}H_{12}$ D. $C_{20}H_{16}$

7. A compound contains 54.55% carbon, 9.09% hydrogen, 36.36% oxygen. The empirical formula of this compound is
   A. C_3H_5O
   B. $C_4H_8O_2$
   C. $C_2H_4O_2$
   D. C_2H_4O
8. Which is not true with respect to cathode rays?
   A. A stream of electrons
   B. Charged particles
   C. Move with speed as that of light
   D. Can be deflected by magnetic fields
   E. Can be deflected by electric fields
9. Which one of the following set of ions represents a collection of isoelectronic species?
   A. K^+, Cl^-, Ca^{2+}, Sc^{3+}
   B. Ba^{2+}, Sr^{2+}, K^+, S^{2-}
   C. N^{3-}, O^{2-}, F^-, S^{2-}
   D. Li^+, Na^+, Mg^{2+}, Ca^{2+}
10. Which transition in the hydrogen atomic spectrum will have the same wavelength as the transition, n = 4 to n = 2 of He^+ spectrum?
   A. n = 4 to n = 3
   B. n = 3 to n = 2
   C. n = 4 to n =2
   D. n =2 to n = 1
11. A gas absorbs photon of 355 nm and emits two wavelengths. If one of the emission is at 680 nm, the other is at
   A. 1035 nm
   B. 325 nm
   C. 743 nm
   D. 518 nm

12. Consider the ground state of Cr atom (Z = 24). The numbers of electrons with the azimuthal quantum numbers, l=1 and 2 are respectively
   A. 12 and 4
   B. 12 and 5
   C. 16 and 4
   D. 6 and 5
13. The electros, identified by the quantum numbers n and l,
   i. n = 3; l = 2
   ii. n = 5; l = 0
   iii. N = 4; l = 1
   iv. n = 4; l =2
   v. n = 4; l = 0

   can be placed in the order of increasing energy, as
   A. I < V < III < IV < II
   B. I < V < III < II < IV
   C. V < I < III < II < IV
   D. V < I < II < III < IV

14. According to IUPAC nomenclature, the name of element having atomic number 116 is
    A. Unnilunium
    B. Ununoctium
    C. Ununhexium
    D. Unnilhexium
15. Electronic configuration of Zn, Cd and Hg is
    A. $(n-1)d^{10}ns^2$
    B. $(n-1)d^9ns^2$
    C. $(n-1)d^8ns^2$
    D. $(n-1)d^8ns^2np^1$
16. Among the elements Ca, Mg, P and Cl, the order of decreasing atomic radii is
    A. Ca > Mg > P > Cl
    B. P > Cl> Ca > Mg
    C. Mg > Ca > Cl > P
    D. Cl > P > Mg > Ca
17. Among the following, O, Cl, F, N, P, Sn, Tl, Na, Ti the number of elements showing only one non-zero oxidation state is
    A. 1
    B. 2
    C. 3
    D. 4

18. The electronic configuration of most electronegative element is
    A. $1s^{2,}$, $2s^2$ $2p^5$
    B. $1s^2$, $2s^2$ $2p^4$, $3s^1$
    C. $1s^2$, $2s^2$ $2p^6$, 3 s^1 3 p^1
    D. $1s^2$, $2s^2$ $2p^{6,}$, $3s^2$ $3p^5$
19. The atomic numbers of elements A, B, C and D are Z – 1, Z, Z + 1 and Z + 2, respectively.
    If 'B' is a noble gas, choose the correct statement among the following statements.
    I. 'A' has higher electron affinity.
    II. 'C' exists in +2 oxidation state.
    III. 'D' is an alkaline earth metal.
    A. I and II
    B. II and III
    C. I and III
    D. I, II and III
20. Which one of the following noble gases has a duplet of electron in its outer shell?
    A. Neon
    B. Argon
    C. Helium
    D. Xenon

21. When a metal combines with a non-metal atom, the non-metal atom will
    A. loses electrons and decrease in size
    B. loses electrons and increase in size
    C. gains electrons and decrease in size
    D. gains electrons and increase in size
22. Lattice energy of an ionic compound depends upon
    A. charge on the ion and size of the ion
    B. packing of ions only
    C. size of the ion only
    D. charge on the ion only
23. The structure of IF_7 is
    A. square pyramidal
    B. trigonal bipyramidal
    C. octahedral
    D. pentagonal bipyramidal
24. Correct order of bond angles in NH_3, PCl_3 and Bcl_3 is
    A. $PCl_3 > NH_3 > BCI_3$
    B. $NH_3 > Bcl_3 > PCl_3$
    C. $NH_3 > Pcl_3 > BCl_3$
    D. $BCl_3 > NH_3 > PCl_3$

25. The number of types of bonds between two carbon atoms in calcium carbide is
    A. one sigma, two pi
    B. one sigma, one pi
    C. two sigma, one pi
    D. two sigma, two pi
26. Which one of the following constitutes a group of the isoelectronic species?
    A. C_2^{2-}, O_2^-, CO, NO
    B. NO^+, C_2^{2-}, CN^-, N_2
    C. CN^-, N_2, O_2^{2-}, C_3^{2-}
    D. N_2, O_2^-, NO^+, CO
27. [X] and [Y] are two nitrates of alkali metals [X] and [Y] on decomposition produces oxides and nitrites respectively. Here [X] and [Y] refer to
    A. $LiNO_3$ and KNO_3
    B) $LiNO_3$ and $LiNO_3$
    C) KNO_3 and $LiNO_3$
    D) None of these
28. Which one of the alkali metals forms only the normal oxide M_2O on heating in air?
    A. Rb
    B. K
    C. Li
    D.Na
29. In diborane, the two H-B-H angles are nearly
    A. 60°, 120°
    B. 95°, 120°
    C. 95°, 150°
    D. 120°, 180°

30. The term anomers of glucose refers to
A. Isomers of glucose that differ in configurations at carbons one and four (C-1) and (C-4)
B. A mixture of (D) – Glucose and (L) – glucose
C. Enantiomers of glucose
D. Isomers of glucose that differ in configuration at carbon one (C-1)

31. In which of the following compounds, H-bond exist ?
I. HF II. NH_3 III. H_2O IV. HI
Select the correct option
A) Only I and II
B) only III and IV
C) I, II and III
D) I, III and IV

32. A bubble of gas released at the bottom of a lake increased to 8 times its original volume when it reaches the surface. Assuming that atmospheric pressure is equivalent to the pressure exerted by a column of water, 10 m height, the depth of the lake is
A. 80 m
B. 90 m
C. 40 m
D. 70 m

33) The internal energy change a system goes from state A to B is 40 kJ/mol. If the system goes from A to B by a reversible path and returns to state A by an irreversible path, what would be the net change in internal energy?
A. 40 kJ
B. $> 40kJ$
C. $< 40kJ$
D. Zero

34) The bond dissociation energies of H_2 Cl_2 and HCl are 104, 58 and 103 kcal mol^{-1} respectively. Then enthalpy of formation of HCl would be
A. -22 kcal mol^{-1}
B. -44 kcal mol^{-1}
C. +44 kcal mol^{-1}
D. +22 kcal mol^{-1}

35. Which of the following is not a physical equilibrium?
A. Ice ⇋ water
B $I_2(s) \leftrightharpoons I_2(g)$
C. $S(l) \leftrightharpoons S(g)$
D. $3O_2 \leftrightharpoons 2O_3$

36) $N_2 + 3H_2 \leftrightharpoons 2NH_3 + heat$. What is the effect of the increase of temperature on the equilibrium of the reaction.
A. equilibrium is shifted to the left
B. equilibrium is shifted to the right
C. equilibrium is unaltered
D. Reaction rate does not change

37) Oxidation states of X,Y,Z are +2, +5 and -2 respectively. The formula of the compound formed by these will be

A. X_2YZ_6
B. $X\,Y_2Z_6$
C. XY_5
D. X_3YZ_4

38. Radioactive isotope of hydrogen is
    A. Tritium
    B. Deuterium
    C. Para hydrogen
    D. Ortho hydrogen
39. Low solubility of CsI is due to
    A. Low lattice energy
    B. High lattice energy
    C. Low hydration energy
    D) High hydration energy
40. Petroleum and natural gas are the main sources of ….A…. here, A refers to
    A. Alkanes
    B. Hydrocarbons
    C. Alkenes
    D) Alkynes