Each question has 4 choices (1), (2), (3) and (4), out of which ONLY ONE is correct. For correct answer +4 marks awarded. No negative marks.

1.	In \triangle ABC, P is a point on the line segment BC. A line <i>l</i> parallel to the side BC intersects the line segments AB, AP and AC in D, E, F, respectively, such that AD = 2019 DB. Then $\frac{AE.FC}{AE.FC}$ is				
	equal to 1) 2019	2) 2017	3) 1	AF.EP 4) 2019/2020	
2.	If the domain of $f(x)$ $f(x) = \sqrt{676x - x^2 - 2019}$ is	is the largest poss defined then the numb	sible subset of natural per of elements in the dom	numbers such that nain of $f(x)$ is	
	1) 2019	2) 676	3) 670	4) 671	
3.	If $D(3, -1)$, $E(2, 6)$ and Formula is	(- 5, 7) are the mid po	bints of the sides of ΔABC	then the area of ΔABC	
	1) 24	2) 48	3) 72	4) 96	
4.	In $\triangle ABC$, $AB = x$, $AC = x$ bisector of the angle A the	y. If D is a point on en BC : BD is	the side BC such that A	D is the internal angle	
	1) x + y : x	2) xy : x	3) 1 : x	4) xy : y	
5.	A function f: $\mathbf{R} \rightarrow \mathbf{R}$ is defined by $f(x) = x - 1 + x - 2 + x - 3 $ for 1) $f(x) = 6 - 3x$, for all x<0 2) $f(x) = x$, for all 3) $f(x) = 6 - 3x$, for all x>2019 4) $f(x) = 3x + 6$,		x-2 + x-3 for all x 2) f(x) = x, for all x < 4) f(x) = 3x + 6, for all	or all real numbers x. Then all x < 2 , for all x < 2019	
6.	In $\triangle ABC$, $AB = 4$, $AC = 6$,	BC = 9. If D is a point	t on \overline{BC} such that $3BD =$	2DC then $\frac{\angle BAD}{\angle CAD}$ is	
	1) 2/3	2) 3/2	3) 4/9	4) 1	
7. Sum of the solutions of the equation $[x] + 4 = 2x$ is $([x]$ denotes the greatest integral to x)				est integer less than or	
	1) 7	2) 7.5	3) 2019	4) not finite	
8. Triangles ABC, DEF are two similar triangles such that B = E = 90°, AB = 8, BC = 9 a the triangle DEF is 100 then AC/DF is				= 8, BC = 9 and area of	
	1) 3/5	2) 2/3	3) 3/2	4) 9/25	
9.	In a triangle ABC, A = 40 ABC in X then the angle s 1) 20 ⁰	⁰ , B = 60 ⁰ . If the bised subtended by the segm 2) 30 ⁰	ctor of angle A meets the nent BX at the circum-cen 3) 40 ⁰	circum circle of triangle tre is 4) 45 ⁰	
10.	Statement 1: If x is a real	number such that $\sqrt{x^2}$	$\overline{2} = 4$ then $x = 4$.		
	Statement 2: If x is a real number such that $\sqrt{x^2} = 9$ then x = ± 3.				
	 Both the statements ar Both the statements ar 	e true 2) St e false 4) St	tatement 1 is true but Sta tatement 2 is true but Sta	tement 2 is false tement 1 is false	
11.	E, F are the mid points of the sides BC and CA, respectively, of \triangle ABC right angled at B and of area 24. Area of the triangle CEF is				

1) 6 2) 4 3) 8 4) $\sqrt{24}$

12.	Statement I: Two simila Statement II: ABCD is a equal to v	ar triangles of equal area a square. Area of the equil $\sqrt{2}$ times the area of the c	are congruent. ateral triangle having one equilateral triangle havin	e of its sides as AC is g one of its sides as	
	AB. 1) Both the statements a 3) Statement I is false, S	re true tatement II is true	2) Statement I is true, S4) Both the statements	Statement II is false are false	
13.	One end of a diameter of	(-2, 5) is (2, 3). The other	end of the diameter		
	1s 1) $(2, -5)$	2) (- 6, 7)	3) (0, 2)	4) (0, -2)	
14.	If a trapezium is cyclic th 1) its parallel sides are ed 3) its diagonals are not ed	ien qual qual	2) its non parallel sides are equal4) it must be a rectangle		
15.	The points (a, 0), (0, a), (1) square 3) rectangle but not a squ	–a, 0) and (0, –a) are the v nare	vertices of a 2) parallelogram but not a rhombus 4) rhombus but not a square		
16.	Suppose O is the circum	centre of $\triangle ABC$ such that	t O lies inside the triang	ele. If angle BOA is	
	110 ^o and angle COA is 9 1) 20 ^o	0° then angle BAC is 2) 60°	3) 80 ⁰	4) 40 ⁰	
17.	If $f(x) = \frac{x^4 + x^2 + 1}{x^2 - x + 1}$, then t	the minimum value of f(x)	is		
	1) $1/4$	2) 3/4	3) -1/4	4) -3/4	
18.	Two equal circles having and $PQ = 6$ then the radi	centres at A and B are i ius of the circles is $2\lambda 4$	ntersecting in two points	P and Q. If $AB = 8$	
	1) 2	2) 4	3) 3	4) (
19.	When $x^4 + ax^3 + 5x^2 + 8x$ 1) 3	 31 is divided by x - 2 th 2) - 2 	e remainder is 5 then a is 3) 2	4) 5	
20.	If $f(x) = 2(\sin^6 x + \cos^6 x) - 1) 1$	$3(\cos^4 x + \sin^4 x)$, the value 2) - 1	e of $f(\pi/8) - 3f(3\pi/8) =$ 3) 2	4) 0	
21.	Notation: $\prod_{i=1}^{k} x_i = x_1 \cdot x_2$	x_k. If $x = \prod_{r=1}^{89^0} \log_e ta$	r^{0} and $y = \prod_{r=1}^{89^{0}} \log_{e}$	$\cot r^0$	
	then $\cos(x^2 - y^2 + 3xy)$ is 1) 0	equal to 2) 1	3) – 1	4) 1/2	
22.	If the sides of a triangle are 7, 24, 25, then the distance between its circumcentre and				
	1) 7	2) 12	3) 12.5	4) 28	
23.	The number of numbers from 1 to 100 each of which is not only exactly divisible by 4 but				
	1) 7	2) 10	3) 20	4) 21	
24.	In a trapezium the lengths of the parallel sides are 10 and 24. P, Q are the mid points of the non parallel sides. If the line PQ intersects the diagonals in R and S then RS is equal to 1) 5 2) 12 3) 16 4) 7				
25.	The average weight of a class of 29 students is 49 kgs. If the weight of the teacher be included, the average raises by 500 gms. The weight of the teacher is				
	1) 45 kg	2) 55 kg	3) 62 kg	4) 64kg	

26.	In an alley a 25m tall ladder is placed against a wall touching the wall at a point 24m high from the level ground. When the ladder is switched over to the wall on the other side of the alle without changing the base position of the ladder, it touches the wall at a point 7m high from t ground. The width of the alley is				
	1) 28m	2) 31m	3) 33m	4) 35m	
27.	There are 250 seniors in a class. 60% have plans to go to college. Of those with plans to college, 40% plan to go to a college out-of-state. The number of students plan to attend i college is				
	1) 60	2) 50	3) 90	4) 20	
28.	Sum of the cub 1) 495	bes of the roots of x ³ – 152 2) 105	$x^2 + 71x - 105 = 0$ is 3) 1060	(4) - 71	
29.	ABCDE is a pentagon inscribed in a circle with centre O. If $AB = BC = CD$ and angle ABC is 1320 then angle AEB is				
	1) 480	2) 24 ⁰	3) 60 ⁰	4) 132 ⁰	
30.	Suppose $f(x) =$ 13 when divide	$ax^2 + bx + c$. $f(x)$ leaves ed by $x - 3$. Also, $f(0) = 4$	a remainder 18 when div . Then $2a + b + c$ is equal	tided by $x + 2$ and a remainder to	
	1) 2	2) 3	3) 5	4) - 35	
31.	The apparent weight of a solid body when measured in water and a liquid are 90 N and 80 N respectively. If the true weight of the body is 100 N, the relative densities of the solid and the liquid are				
	1) 5 and 2	2) 10 and 2	3) 2 and 1	4) 8 and 4	
32.	A body moves of this body for	A body moves in a circular path at a constant speed of π m/s. The magnitude of average velocity of this body for half a revolution is			
	1) 1 ms ⁻¹	2) 2 ms ⁻¹	3) 3 ms ⁻¹	4) 4 ms ⁻¹	
33.	A freely falling body strikes a horizontal surface and raises to a height 1/64 of the height from which it was dropped. If the velocity with which it hits the floor is v, the change in the magnitude of velocity due to impact with the floor is 1) $7v/8$ 2) $5v/8$ 4) $9v/8$				
34.	In the previous	s question, magnitude of	the change in the of veloci	ty of the body due to impact is	
	1) 7v/8	2) 5v/8	3) 3v/8	4) 9v/8	
35.	The mass of a spherical planet is 8 times that of the earth and its density is same as that of earth. The acceleration due to gravity (in ms ⁻²) on the surface of this planet will be (gravity on earth is 9.8 ms ⁻²)				
	1) 78.4	2) 19.6	3) 9.8	4) 4.9	
36.	A constant horizontal force acts on a body of mass 9 kg lying at rest on a smooth horizontal surface for 10 s. If the body moves 25 m in this time, the magnitude of the force is 1) 4.5 N 2) 2 N 3) 3 N 4) 4 N				
37.	Steam at 100°C is passed in to a calorimeter of water equivalent 10 g containing 290 g of water at 30 °C till the temperature of water raises to 40°C. The mass of steam condensed is (Latent heat of steam is 540 cal/g)				
	1) 10 g	2) 2.5 g	3) 3 g	4) 5 g	
38.	An electric bu negligible 1) 1 A	lb is rated 40 W at 80 V internal resistance, 2) 2 A	V. If it is connected in pa the current the 3) 0.5 A	rallel to a 40 V supply having hrough the bulb is 4) 0.25 A	

- 39. Electromagnetic radiations in the increasing order of wavelength from the following is1) Infrared waves, radio waves, x rays, visible light
 - 2) radio waves, Infrared waves, visible light, x rays
 - 3) x rays, visible light, Infrared waves, radio waves
 - 4) radio waves, visible light, Infrared waves, x rays
- 40. The angle of minimum deviation of an equilateral prism is 30° . The velocity of light inside the prism is (velocity of light in vacuum = $3 \times 10^8 \text{ ms}^{-1}$)

1) $1.8 \times 10^8 \text{ ms}^{-1}$ 2) $2 \times 10^8 \text{ ms}^{-1}$ 3) $2.121 \times 10^8 \text{ ms}^{-1}$ 4) $7.07 \times 10^7 \text{ ms}^{-1}$

- 41. The resistivity of the material of a wire is $10^{-7} \Omega m$. If the wire is stretched to increase its length by 50%, then its resistivity will be (assume stretching does not change the temperature) 1) $10^{-7} \Omega m$ 2) $1.5 \times 10^{-7} \Omega m$ 3) $2.25 \times 10^{-7} \Omega m$ 4) $2 \times 10^{-7} \Omega m$
- 42. The reading of the ammeter (below, left) in the circuit (Assume voltmeter and ammeter are ideal) is
 - 1) 2 A 2) 1A 3) 3 A

43. In the previous question, reading of the voltmeter is 1) 20 V 2) 40 V 3) 80 V





4) 4 A

44. A convex lens of focal length 10 cm and a convex mirror of focal length f_m are mounted coaxially (above, right). The image of a point object located on the axis 15 cm to the left of the lens coincides with the object itself. Focal length f_m of the mirror is 1) 5 cm 2) 10 cm 3) 15 cm 4) 20 cm

45. In the previous question if the mirror is removed, the distance between the image and object will be

1) 30 cm 2) 45 cm 3) 60 cm 4) 75 cm

46. A long straight horizontal wire carries a current from south to north. Magnetic field vertically above the wire is directed

1) westward2) eastward3) northward4) southward47.All atoms of same element must have same
1) number of neutrons2) number of nucleons2) number of nucleons

3) atomic number 4) mass number

- 48. A charged particle is moving in a magnetic field at right angles to the field in a circular path of radius R. If a particle with same charge and twice greater mass were to be moving with half the velocity in the same magnetic field with its velocity at right angles to the field, the radius of its circular path would be
 - 1) 2R
 2) R
 3) 3R
 4) 4R
- 49.A radionuclide of atomic mass 300 amu on fission liberates 200 MeV of energy. The energy
liberated when 1 g of this radionuclide undergoes fission is (given Avogadro number = 6×10^{23})
1) 6.4×10^{10} J2) 6.4×10^{11} J3) 6.4×10^{12} J4) 6.4×10^{13} J
- 50. A nuclear reactor operates using the fissionable material mentioned in the previous question. If it were to use 540 g of the material in a day, it's power would be (assume 50% efficiency in conversion of energy released in the fission in to electrical energy)
 1) 100 MW
 2) 200 MW
 3) 300 MW
 4) 400 MW

What is the IUPAC name of the following compound ? 51.1) 3-Bromo-1,2-dimethylbut-1-ene 2) 4-Bromo-3-methylpent-2-ene 3) 2-Bromo-3-methylpent-3-ene 4) 3-Bromo-3-methyl-1,2-dimethylprop-1-ene Iodine reacts with concentrated HNO₃ to yield Y along with other products. The oxidation state 52.of iodine in Y,is:-1)52)33)14) 7 In a chemical reaction, A + 2B = 2C + D, the initial concentration of B was 1.5 times of 53. the concentration of A, but the equilibrium concentrations of A and B were found to be equal. The equilibrium constant (K) for the aforesaid chemical reaction is: 4) $\frac{1}{4}$ 1) 162)43)150mL of 0.5 M oxalic acid is needed to neutralize 25mL of sodium hydroxide solution. The 54.amount of NaOH in 500 mL of the given sodium hydroxide solution is : 1) 40 g 2) 20 g 3) 80 g 4) 10 g The metal that forms nitride by reacting directly with N_2 of air, is : 55. 1) K 2) Cs 3) Li 4) Rb 56. For the reaction, $2A + B \rightarrow$ Products, when the concentrations of A and B both were doubled, the rate of the reaction increased from 0.3 mol $L^{-1}S^{-1}$ to 2.4 mol $L^{-1}S^{-1}$. When the concentration of A alone is doubled, the rate increased from 0.3 mol $L^{-1}S^{-1}$ to 0.6 mol $L^{-1}S^{-1}$ Which one of the following statements is correct? 1) Order of the reaction with respect to B is 2 2) Order of the reaction with respect to A is 2 3) Total order of the reaction is 4 4) Order of the reaction with respect to B is 1 For the following reaction, the mass of water produced from $445 \text{ g of } C_{57}H_{110}O_6$ is : 57. $2C_{57}H_{110}O_6(s) + 163 O_2(g) \rightarrow 114 CO_2(g) + 110 H_2O(l)$ 3) 890 g 1) 495 g 2) 490 g 4) 445 g When the first electron affinity of oxygen is -141kJ/mol, its second electron affinity is ; 58. 1) almost the same as that of the first 2) negative, but less negative than the first 3) a positive value 4) a more negative value than the first An open vessel at 27°C is heated until two fifth of the air (assumed as an ideal gas) in it has 59. escaped from the vessel. Assuming that the volume of the vessel remains constant, the temperature at which the vessel has been heated is : 1) 750°C 2) 500°C 3) 750 K 4) 500 K If K_{sp} of Ag₂CO₃ is 8 X 10⁻¹², the molar solubility of Ag₂CO₃ in 0.1 M AgNO₃ is : 60. 1) 8x10⁻¹² M 2) 8x10⁻¹⁰ M 3) 8x10⁻¹¹ M 4) 8x10⁻¹³ M 61. Chlorine on reaction with hot and concentrated sodium hydroxide gives : 3) Cl^{-} and ClO^{-} 1) Cl⁻ and ClO $\overline{2}$ 2) Cl⁻ and ClO $\frac{1}{3}$ 4) ClO_{$\overline{3}$} and ClO_{$\overline{2}$} 0.5 moles of gas A and x moles of gas B exert a pressure of 200 Pa in a container of volume 10 62. m³ at 1000 k. given R is the gas constant in JK⁻¹ mol⁻¹, x is :

H₂C

CH₃

1)
$$\frac{2R}{4+R}$$
 2) $\frac{2R}{4-R}$ 3) $\frac{4-R}{2R}$ 4) $\frac{4+R}{2R}$

63. In general, the properties that decrease and increase down a group in the periodic table, respectively are :

3) SiH_4

2) electronegativity and atomic radius

4) GaH₃

1) electronegativity and electron gain enthalpy

3) atomic radius and electronegativity

 $4) electron\ gain\ enthalpy\ and\ electrone gativity$

64. The hydride that is NOT electron deficient is:1) B₂H₆2) AlH₃

65. Match the following items in column I with the corresponding items in column II

		COLUMN I			COLUMN II		
	i)	Na ₂ CO ₃ .10H ₂ O P) Portland cement ingredient		nt			
	ii)	ii) Mg(HCO ₃) ₂		Q)	Castner-Keller process		
	iii)	NaOH		R)	Solvay process		
	iv)	$Ca_3Al_2O_6$		S)	Temporary hardness		
	$1) i) \rightarrow R; ii) \rightarrow Q; iii) \rightarrow S; iv) \rightarrow P \qquad 2) i) \rightarrow R; ii) \rightarrow S; iii) \rightarrow Q; iv) \rightarrow P$						
	3) i)→S;	3) i) \rightarrow S; ii) \rightarrow P; iii) \rightarrow Q; iv) \rightarrow R			4) i) \rightarrow Q; ii) \rightarrow R; iii) \rightarrow P; iv) \rightarrow S		
66.	25 ml of the given HCl solution requires 30 ml of 0.1 M sodium carbonate solution. What is volume of this HCl solution required to titrate 30 ml of 0.2 M aqueous NaOH solution?				That is the		
	1) 25 ml	l	2) 50 ml		3) 12.5 ml	4) 75 ml	
67.	The correct order of the atomic radil of C,Cs,Al and S is :						
	1) $S < 0$	S < C < Al < Cs 2) $S < C < Cs < A$		Al	3) C < S < Cs < Al	4) C < S <	Al < Cs
68.	The pair	r that does NOT	require calcination	ons is :			
	1) ZnO and MgO				2) Fe_2O_3 and $CaCO_3.MgCO_3$		
	3) ZnO and Fe ₂ O ₃ .xH ₂ O				4) ZnCO ₃ and CaO		
69.	5 moles of AB_2 weigh $125x10^{-3}$ kg and 10 moles of A_2B_2 weigh $300x10^{-3}$ kg. The molar mass of $A(M_A)$ and molar mass of $B(M_B)$ in kg mol ⁻¹ are:						
	1) M_A =50x10 ⁻³ and M_B =25x10 ⁻³			2) M_A =25x10 ⁻³ and M_B =50x10 ⁻³			
	3) M _A =5x10 ^{.3} and M _B =10x10 ^{.3}				4) M_A =10x10 ⁻³ and M_B =5x10 ⁻³		
70.	The mole fraction of a solvent in aqueous solution of a solute is 0.8. The molality (in mol kg^{-1}) of the aqueous solution is						
	1) 13.88	x10 ⁻¹	2) 13.88x10 ⁻²		3) 13.88	4) 13.88x1	0-3