PART-1 : PHYSICS

SECTION-I

1) A pair of physical quantities having the same dimensional formula are :

(A) Momentum and impulse
(B) Momentum and energy
(C) Energy and pressure
(D) Force and power

2) π is a

(A) Dimensionless constant
(B) Dimensional constant
(C) Dimensionless variable
(D) Dimensional variable

3) The SI unit of a physical quantity is $[Jm^{-2}]$. The dimensional formula for that quantity is :

(A) $[M^1L^{-2}]$
(B) $[M^1L^0T^{-2}]$
(C) $[M^1L^2T^{-1}]$
(D) $[M^1L^{-1}T^{-2}]$

4) If the force is given by $F = at + bt^2$ with t as time. The dimensions of a and b are :

(A) $[MLT^{-4}]$, $[MLT^{-2}]$
(B) $[MLT^{-3}]$, $[MLT^{-4}]$
(C) $[ML^2T^{-3}]$, $[ML^2T^{-2}]$
(D) $[ML^2T^{-3}]$, $[ML^3T^{-4}]$

5) Which of the following is NOT a fundamental unit is SI

(A) Gram
(B) Candela
(C) Ampere
(D) None of the above.

6) If the fundamental units of length, mass and time are halved, the unit of momentum will be :

(A) Doubled

(B) Halved

(C) Same

(D) Four times

7) The dimensional formula for universal gravitational constant is [Hint : use $F = \frac{Gm_1n_1}{r^2}$]:

(A) $M^1L^3T^{-2}$

(B) $M^0L^2T^{-2}$

(C) $M^1L^2T^{-2}$

(D) $M^{-1}L^3T^{-2}$

8) Find the value of $\sin 30° + \sin 150°$

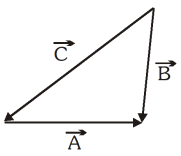
(A) 1

(B) 0

(C) 2

(D) –1

9) For the figure–



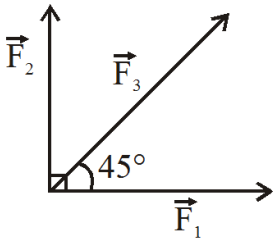
(A) $\vec{A} + \vec{B} = \vec{C}$

(B) $\vec{B} + \vec{C} = \vec{A}$

(C) $\vec{C} + \vec{A} = \vec{B}$

(D) $\vec{A} + \vec{B} + \vec{C} = 0$

10) $|\vec{F}_1| = |\vec{F}_2| = \frac{|\vec{F}_3|}{\sqrt{2}} = P$ If then find magnitude of resultant forces $\vec{F}_1 + \vec{F}_2 + \vec{F}_3$:-



(A) $2\sqrt{2}\,P$

(B) $\left(1+\sqrt{2}\right)P$

(C) $\left(2+\sqrt{2}\right)P$

(D) P

11) The vector $\vec{P} = a\hat{i} + a\hat{j} + 3\hat{k}$ and $\vec{Q} = a\hat{i} - 2\hat{j} - \hat{k}$ are perpendicular to each other. The positive value of a is :

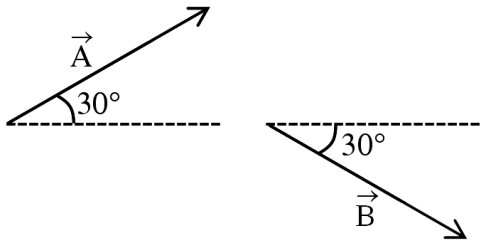
(A) 3

(B) 2

(C) 1

(D) zero

12) Two vectors $\vec{A}\&\vec{B}$ are shown in figure. The angle between $\vec{A}\&\vec{B}$ is :-



(A) 30°

(B) 60°

(C) 300°

(D) 90°

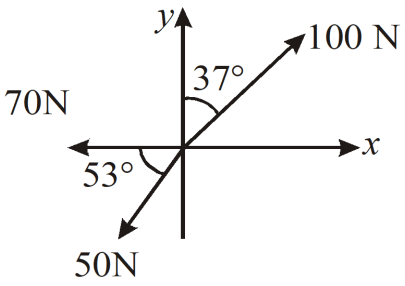
13) The angle between $(\hat{i} + \hat{j} + \hat{k})$ & $(2\hat{i} + 2\hat{j} - 2\hat{k})$ is

(A) $\text{Cos}^{-1}\frac{1}{3}$

(B) $\text{Cos}^{-1}\frac{1}{\sqrt{3}}$

(C) $\text{Sin}^{-1}\frac{1}{3}$

(D) None of these.



14) What is the resultant of addition of these forces

(A) 40 N

(B) 40√2 N

(C) 50 N

(D) 50√2 N

15) F is a force represented by the vector $\vec{F} = 2\hat{i} + 4\hat{j}$ and s is displacement vector given by $\vec{s} = \hat{i} + \hat{j}$.

The component of force in the direction of displacement is

(A) $\sqrt{20}$
(B) $\sqrt{2}$
(C) $3\sqrt{2}$
(D) 6

16) The vector sum of the forces 10 N and 6N can be :-

(A) 2N
(B) 8 N
(C) 18 N
(D) 20 N

17) Value of tan(106°) will be :-

(A) $\frac{24}{7}$
(B) $-\frac{7}{24}$
(C) $-\frac{24}{7}$
(D) $-\frac{8}{3}$

18) Find out angle subtended by a circular arc of length 12m, having radius 4m :-

(A) 3°
(B) 171.9 rad
(C) 171.9°
(D) $\frac{1}{3}$rad

19) Value of sin (74°) is :

(A) $\frac{25}{24}$
(B) $\frac{24}{25}$
(C) $\frac{6}{25}$
(D) $\frac{12}{25}$

20) In $S = a + bt + ct^2$. S is measured in metres and t in seconds. The unit of b is

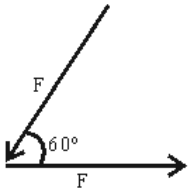
(A) None
(B) m

(C) ms^{-1}

(D) ms^{-2}

SECTION-II

1) Two forces, each equal to F, act as shown in figure. Their resultant is (F = 8N)



2) Three forces of equal magnitude F are along sides of an equilateral triangle in an order. Resultant of three forces is

3) The work done by a force on a particle is given by $WD = \vec{F}.\vec{d}$. If $\vec{F}$ (Newton) = $\hat{i}-3\hat{j}$ and $\vec{d}$ (meter) = $3\hat{i}-1\hat{j}$ then find the Work done in joule.

4) Given two vectors $\vec{A} = x\hat{i}-2\hat{j}+3\hat{k}$ and $\vec{B} = 2\hat{i}-\hat{j}+2x\hat{k}$. If vector $\vec{A}$ and $\vec{B}$ are perpendicular to each other, then the value of 8x is.

5) In a given system of units, 1 unit of mass = 2 kg, 1 unit of length = 5 m and 1 unit of time = 5 sec. In this system, 1 N represents x units of force. Value of 2x is

6) In a new unit system, 1 unit of time is equal to 10 second, 1 unit of mass is 5 kg and 1 unit of length is 20 m. In this new system of units, 1 unit of energy in this system is equal to x J, find x ?

7) Force F & density ρ are related as $F = \frac{\alpha}{\beta+\rho}$. If dimension of length in α is 'x' and dimension of length in β is 'y' then write the value of |x + y|.

8) In a new system of units, if unit of time is halved and units of length and mass are doubled then unit of force in the new system becomes n times of its previous one. Find $\frac{n}{2}$.

9) The velocity of freely falling body changes as $g^p h^q$ where g is the acceleration due to gravity and h is the height. The values of p+q is:

10) Angle between the two vectors $\vec{A} = 2\hat{i}+\hat{j}-\hat{k}$ and $\vec{B} = \hat{i}-\hat{k}$ is $\frac{\pi}{n}$. Find the value of n :-

PART-2 : CHEMISTRY

SECTION-I

1) The maximum number of molecules are present in-

(A) 15 L of H_2 gas at STP
(B) 5 L of N_2 gas at STP
(C) 0.5 L of H_2 gas at STP
(D) 10 L of O_2 gas at STP

2) The number of electron in 3.1 mg NO_3^{-1} is-

(A) 32
(B) 1.6×10^{-3}
(C) 9.6×10^{20}
(D) 9.6×10^{23}

3) Out of Molarity (M). Molality (m), % w/v and Mole fraction (x), those independent of temperature are

(A) M,m
(B) M,%w/v
(C) m,x
(D) M,x

4) Molarity of H_2SO_4 is 18 M. Its density is 1.8g /cm^3 hence molality is:

(A) 18
(B) 100
(C) 36
(D) 500

5) The amount of oxygen in 3.6 moles of water is

(A) 28.8g
(B) 18.4g
(C) 115.2g
(D) 57.6g

6) An organic compound contains C, H and S. The minimum molecular weight of the compound containing 8% sulphur is: (atomic weight of S = 32 amu)

(A) 300g mol^{-1}
(B) 400g mol^{-1}
(C) 200g mol^{-1}
(D) 600g mol^{-1}

7) Which of the following set of compounds follow law of reciprocal proportion?

(A) H_2S, H_2O, SO_2

(B) H_2S, H_2O, HNO_3

(C) SO_2, NO_2, H_2

(D) NO_2, NO, N_2O

8) $^{35}_{17}Cl$ and $^{37}_{17}Cl$ differ in

(A) Atomic Number

(B) Number of neutrons

(C) Number of electrons

(D) Number of protons

9) For the reaction:
$7A + 13B + 15C \rightarrow 17P$
If 15 moles of A, 26 moles of B & 30.5 moles of C are taken initially then limiting reactant is–

(A) A

(B) B

(C) C

(D) None of these

10) Equal weight of NaCl and KCl are dissolved separately in equal volumes of solutions. Molarity of the solution will be

(A) Equal

(B) Greater for NaCl

(C) Greater for KCl

(D) Uncomparable

11) 1 mol of CH_4 contains

(A) 6.02×10^{23} atoms of H

(B) 4 g atom of Hydrogen

(C) 1.81×10^{23} molecules of CH_4

(D) 3.0 g of carbon

12) 1 amu is equal to

(A) $\frac{1}{12}$ of $C-12$

(B) $\frac{1}{14}$ of $O-16$

(C) 1g of H_2

(D) 1.66×10^{-24}kg

13) Which of the following has the maximum number of atoms ?

(A) 24 gm of C(12)
(B) 56 gm of Fe(56)
(C) 27 gm of Al(27)
(D) 108 gm of Ag (108)

14) A compound of X and Y has equal mass of them. if their atomic weights are 30 and 20 respectively. Molecular formula of that compound (its mol. wt. is 120) could be -

(A) XY
(B) X_2Y_3
(C) X_2Y_2
(D) X_3Y_3

15) 2.76 g of Ag_2CO_3 on being heated strongly yields a residue weighing:

$Ag_2CO_3(s) \rightarrow 2Ag(s) + CO_2(g) + \frac{1}{2}O_2(g)$

(A) 2.16 g
(B) 2.48 g
(C) 2.32 g
(D) 2.64 g

16) Empirical formula of glucose is -

(A) $C_6H_{12}O_6$
(B) $C_3H_6O_3$
(C) $C_2H_4O_2$
(D) CH_2O

17) The % mass of K in KCl. $MgCl_2.6H_2O$:-

(A) 24
(B) 34
(C) 14
(D) 44

18) Which has maximum molecules?

(A) 7g N_2
(B) 2g H_2
(C) 16g NO_2
(D) 16g O_2

19) If 20g of $CaCO_3$ is present in 100 g aqueous solution ($d_{solution}$ = 1g/ml) then molarity of solution is :

(A) 2 M

(B) 3 M

(C) 4 M

(D) 0.2 M

20) Calculate the density (in gm/mL) of aqueous NaOH solution of which molarity and (%w/w) are equal:

(A) 8

(B) 4

(C) 2

(D) 1

SECTION-II

1) The number of moles of carbon in 48 grams methane will be:

2) The ratio of the vapour density of O_3 to the vapour density of CH_4 will be:

3) The mass percentage of nitrogen in histamine ($C_5H_9N_3$) is__ (Round off integer)

4) The molecular formula of a compound is X_4O_9. If the compound contains 40% X by mass, then what is the atomic mass of X?

5) 342gm of cane sugar is present in 1000ml solution then what is the molarity of solution_____

6) An element X has three isotopes X^{20}, X^{21} and X^{22}. The percentage abundance of X^{20} is 90% and average atomic mass of the element is 20.18. The percentage abundance of X^{21} should be

7) At STP 20 g hydrogen has volume in litre:

8) The ratio of masses of oxygen and nitrogen in a particular gaseous mixture is 1 : 4. The ratio of number of their molecule is
[Express your answer in terms of x : 32 & calculate x.]

9) Total number of proton in $CaCO_3$:

10) A gaseous hydrocarbon gives 0.72 g of water and 3.08 g of CO_2 on combustion. The formula of the hydrocarbon is is C_xH_y. then the value of (x + y) is

PART-3 : MATHEMATICS

SECTION-I

1) If $\frac{4}{2+\sqrt{3}+\sqrt{7}} = \sqrt{a}+\sqrt{b}-\sqrt{c},$ then which of the following can be true : -

(A) a = 1, b = 4/3, c = 7/3
(B) a = 1, b = 2/3, c = 7/9
(C) a = 2/3, b = 1, c = 7/3
(D) a = 7/9, b = 4/3, c = 1

2) $\left(7^{\left(-\frac{1}{2}\right)} \times 5^2\right)^2 \div \sqrt{25^3} =$

(A) $\frac{5}{7}$
(B) $\frac{7}{5}$
(C) 35
(D) $-\frac{5}{7}$

3) Remainders where $P(x) = ax^2 - bx + 2$ when divided by x – 1 and x + 1 are 3 and 5 respectively then value of a – 2b is :

(A) 1
(B) –1
(C) 0
(D) 2

4) Which of the following is correct ?

(A) $3^{1/3} < 4^{1/4}$
(B) $2^{1/2} > 3^{1/3}$
(C) $5^{1/5} < 4^{1/4}$
(D) $2^{1/2} < 4^{1/4}$

5) Exact value of $\left(8+\sqrt{60}\right)^{\frac{1}{2}} + \left(8-\sqrt{60}\right)^{\frac{1}{2}}$ is

(A) $2\sqrt{3}$
(B) 16
(C) $2\sqrt{5}$

(D) 8

6) Sum of 2 digit positive integers which are divisible by 4 and 9 is :

(A) 326
(B) 108
(C) 1053
(D) 1228

7) If x+ y = 1 and $x^2 + y^2 = 2$ then the value of $x^4 + y^4$ equals

(A) 7
(B) 6
(C) 7/2
(D) 19/4

8) A = {a, e, i, o, u}and B = {i, o} then the true statement is -

(A) A ⊂ B
(B) B ⊂ A
(C) A = B
(D) A is equivalent to B

9) Solve : $\frac{\sqrt{10+3x}+\sqrt{10-3x}}{\sqrt{10+3x}-\sqrt{10-3x}} = 3.$

(A) x = 4
(B) x = 5
(C) x = 7
(D) x = 2

10) The solution set of the inequality $\frac{1}{x} < 1$ is

(A) $(1, \infty)$
(B) $(-\infty, 1)$
(C) $(-\infty, 0) \cup (1, \infty)$
(D) none of these

11) If a,b ∈ N and a + b = ab then number of ordered pair (a,b) is equal to

(A) 2
(B) 3
(C) 0
(D) 1

12) The sum of all solution(s) of the equation $||x - 2| - 3| = 1$ is

(A) 0
(B) 4
(C) 6
(D) 8

13) Which of the following is a null set ?

(A) A = {x : x > 1 and x < 1]
(B) B = {x : x + 3 = 3}
(C) C = {ϕ}
(D) D = {x : x ≥ 1 and x ≤ 1}

14) Roster form of the set A = {x : x ∈ N, $x^2 < 30$}

(A) {1, 2, 3, 4, 5}
(B) {0, 1, 2, 3, 4, 5}
(C) {–5, –4, –3, ... 4, 5}
(D) None of these

15) Let A and B be two sets then (A ∪ B)' ∪ (A' ∩ B) is equal to

(A) A'
(B) A
(C) B'
(D) None of these

16) Let A and B be two sets such that n(A) = 70, n(B) = 60 and $n(A \cup B) = 110$. Then $n(A \cap B)$ is equal to

(A) 240
(B) 20
(C) 100
(D) 120

17) If A = {2, 3, 4, 8, 10}, B = {3, 4, 5, 10, 12}, C = {4, 5, 6, 12, 14} then (A ∩ B) ∪ (A ∩ C) is equal to

(A) {3, 4, 10}
(B) {2, 8, 10}
(C) {4, 5, 6}
(D) {3, 5, 14}

18) Remainder when $f(x) = x^5 - x^3 + 3x^2 + 3x + 1$ is divided by $(x^2 - 1)$ is

(A) 3x + 4

(B) 2x – 3

(C) 3x + 1

(D) 2x + 5

19) If $x-\frac{2}{x-1}=1-\frac{2}{x-1}$, then number of solution is

(A) 1

(B) 2

(C) 3

(D) 0

20) If $\frac{a+b}{2\sqrt{ab}}=2$ (where a > b) then a : b =

(A) $(7-4\sqrt{3}):1$

(B) $(7+4\sqrt{3}):1$

(C) $(2-\sqrt{3}):(3+\sqrt{3})$

(D) 2 : 3

SECTION-II

1) If P(x) is a cubic polynomial such that P(1) = 1; P(2) = 2; P(3) = 3 with leading coefficient 3, then sum of digits of P(4) is equal to _____.

2) If m, n are positive integers and $m+n\sqrt{2}=\sqrt{44+24\sqrt{2}}$, then (m + n) is equal to _____.

3) If $a^2 + b^2 + c^2 - ab - bc - ca \le 0$, (where a, b, c are non-zero real numbers), then the value of $\frac{a+b+c}{c}$ is equal to _____.

4) If $x = 1+\sqrt{3}$, then the value of $x^4 - x^3 - 2x^2 - 6x + 1$ is equal to _____.

5) Let A = {a, b, c, d, e} then total number of proper subset of A -

6) Let n(U) = 600, n(A) = 200, n(A∩B) = 100 and $n(A^c \cap B^c) = 200$ then n(A'∩B) = ?

7) If aN = {ax : x ∈ N}, then the set 3N ∩ 5N =αN, find the value of α

8) Number of positive integers for which $\frac{(x+3)(x-1)}{x^2(x-2)^3} \leqslant 0$ holds is .....

9) If $\left[\sqrt[3]{\sqrt[6]{a^9}}\right]^4 \left[\sqrt[6]{\sqrt[3]{a^9}}\right]^4 = a^k$
The value of k is _____ .

10) The absolute value of the sum of all solution of the equation $\left(x^2+3x+1\right)^{x^2+4x-32} = 1$, is equal to

ANSWER KEYS

PART-1 : PHYSICS

SECTION-I

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A.	A	A	B	B	A	B	D	A	C	A	A	B	A	B	C	B	C	C	B	C

SECTION-II

Q.	21	22	23	24	25	26	27	28	29	30
A.	8.00	0.00	6.00	2.00	5.00	20.00	5.00	8.00	1.00	6.00

PART-2 : CHEMISTRY

SECTION-I

Q.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
A.	A	C	C	D	D	B	A	B	B	B	B	A	A	B	A	D	C	B	A	B

SECTION-II

Q.	51	52	53	54	55	56	57	58	59	60
A.	3.00	3.00	38.00	24.00	1.00	2.00	224.00	7.00	50.00	15.00

PART-3 : MATHEMATICS

SECTION-I

Q.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A.	A	A	C	C	C	B	C	B	D	C	D	D	A	A	A	B	A	A	D	B

SECTION-II

Q.	81	82	83	84	85	86	87	88	89	90
A.	5.00	8.00	3.00	5.00	31.00	200.00	15.00	1.00	4.00	9.00

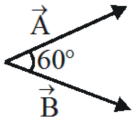
SOLUTIONS

PART-1 : PHYSICS

11) $\vec{P}.\vec{Q} = 0 \Rightarrow \left(a\hat{i} + a\hat{j} + 3\hat{k}\right).\left(a\hat{i} - a\hat{j} - 3\hat{k}\right) = 0$

$a^2 - 2a - 3 = 0 \Rightarrow (a - 3)(a + 1) = 0 \Rightarrow a = 3, -1$

12)



15)

$F \cos\theta = \frac{\vec{F}\cdot\vec{S}}{|\vec{S}|} = \frac{6}{\sqrt{2}} = 3\sqrt{2}$

16)

$4 \le R \le 16$

17)

$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$

$\tan 106° = \frac{2\tan 53°}{1-\tan^2 53°}$

27)

$F = \frac{\alpha}{\beta + \rho}$

$MLT^{-2} = \frac{\alpha}{ML^{-3}}$

$\Rightarrow a = M^2L^{-2}T^{-2}$

$b = ML^{-3}$

$\square (-2 - 3) = 5$

28)

$n_1u_1 = n_2u_2$

$n_1[M_1L_1T_1^{-2}] = n_2[M_2L_2T_2^{-2}]$

$\frac{n_1}{n_2} = \left(\frac{M_2}{M_1}\right)\left(\frac{L_2}{L_1}\right)\left(\frac{T_1}{T_2}\right)^2 = 2 \times 2 \times (2)^2$

$n = \frac{n_1}{n_2} = 16$

29)

$[v] = [g]^p[h]^q$
$= \left[LT^{-2}\right]^p[L]^q$
$= \left[L^{p+q}T^{-2p}\right]$
$p + q = 1$

30) $\cos\theta = \frac{\vec{A}\cdot\vec{B}}{AB} = \frac{3}{\sqrt{6}\sqrt{2}} = \frac{\sqrt{3}}{2}$
$= \theta = 30^\circ$

PART-2 : CHEMISTRY

41) M.w.t. = 12 × 4 × 1 = 16

44)

Element	Atomic Mass	%	%/At. mass	
X	30	50%	50/30	$\frac{5}{3} \times \frac{6}{5} = 2$
Y	20	50%	50/20	$\frac{5}{2} \times \frac{6}{5} = 3$

X_2Y_3 → Empirical formula

$n = \frac{\text{Molecular mass}}{\text{Empirical formula mass}}$

$= \frac{120}{2 \times 30 + 3 \times 20} = \frac{120}{120} = 1$

Molecular formula = X_2Y_3

47) $\%\ K = \frac{39}{277.5} \times 100 = 14$

48)

7g N_2 = 7/28 mol = 0.25 mol,
2g H_2 = 2/2 = 1 mol,
16g NO_2 = 16/46 mol,
16g O_2 = 16/32 mol = 0.5 mol.

49)

$M = \frac{20 \times 1000}{100 \times 100} = 2M$

50)

Let Molarity = M
⇒ 1 L of solution has M moles of solute = (40 M) gm of NaOH .....(1)
 M % (w/w) means
M g of NaOH is present in 100 g solution
⇒ 40 M g solute will be present in $\left(\frac{100}{M} \times 40M\right)$ gm of solution = 4000 gm of solution .....(2)
Comparing (1) and (2), we get
Density (d) = $\frac{W_{solution}}{V_{solution}}$
$= \frac{4000g}{1000\ mL} = 4$ gm/mL

Alternate method

Molarity = $\frac{w}{w}\%$

$$\frac{n \times 1000}{V(mL)} = \frac{n \times 40}{d \times V(mL)} \times 100$$

$$d = \frac{4000}{1000} = 4\ gm/mL$$

58)

O_2 and N_2
Let may be

x **4x**

 moles $\frac{x}{32}$ $\frac{4x}{28}$

 ratio of molecules will be 7 : 32.

60) x = 7 & y = 8
So x + y = 15

PART-3 : MATHEMATICS

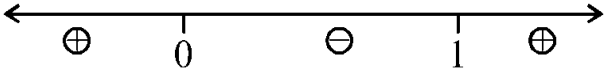
64)

$5^{1/5} < 4^{1/4}$ because taking power 20 on both sides we have $5^4 < 4^5$.

66)

Only two numbers are possible 36, 72
Sum = 108

70) $\frac{1}{x} < 1 \Rightarrow \frac{1-x}{x} < 0 \Rightarrow \frac{x-1}{x} > 0$



$x \in (-\infty, 0) \cup (1, \infty)$

71)

a + b = a.b
⇒ a + b ab = 0
⇒ a – ab + b – 1 = –1
⇒ a(1 – b) – 1(–b + 1) = –1
⇒ (1 – b) (a – 1) = –1
⇒ (a – 1) (b – 1) = 1
Case-1 : a –1 = 1 and b –1 = 1
⇒ a = 2 and b = 2
(a,b) = (2,2)
Case-2 : a – 1 = –1 and b – 1 = – 1
⇒ a = 0 and b = 0
(a,b) = (0,0) reject

72) $||x - 2| - 3| = 1$
⇒ |x – 2| – 3 = ± 1
⇒ |x – 2| = 4, 2
⇒ (x – 2) = ± 4, ±2
⇒ x = –2, 0, 4, 6

74) Since $6^2 > 30$ hence x = 1, 2, 3, 4, 5

78)

$x^5 - x^3 + 3x^2 + 3x + 1$
= (x + 1)(x – 1) q(x) + ax + b
put x = 1 ⇒ a + b = 7
x = –1 ⇒ –a + b = 1
⇒ b = 4, a = 3
Remainder = 3x + 4

85)

Total subset = 2^5
Proper subset = 2^5–1

86)

$n(A^c \cap B^c) = n[(A \cup B)^c] = n(U) - n(A \cup B)$
$n(A \cup B) = 600 - 200 = 400$
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
400 = 200+n(B) – 100
n(B) = 300
$n(A' \cap B) = n(B) - n(A \cap B) = 300 - 100 = 200$

87)

3N = {3, 6, 9, 12,15,18,...}
5N = {5, 10, 15, 20, 25,...}
3N ∩ 5N = {15, 30, 45, 60,.....}
Note : If a number is multiple of 3 as well as 5 it will be a multiple of 15, i.e. LCM (3, 5) = 15.

89)

$$a^{9\left(\frac{1}{6}\right)\left(\frac{1}{3}\right)^4} \cdot a^{9\left(\frac{1}{3}\right)\left(\frac{1}{6}\right)^4} = a^2 \cdot a^2 = a^4$$

90)

(i) Exponent = 0 & Base ≠ 0
(ii) Base = 1
(iii) Base = –1 & Exponent is even
(i) $x^2 + 4x - 32 = 0$
$(x + 8)(x - 4) = 0$
$x = -8, 4$
(ii) $x^2 + 3x + 1 = 1$
$x^2 + 3x = 0$
$x = 0, -3$
(iii) $x^2 + 3x + 1 = -1$
$x^2 + 3x + 1 = -1$
$x = -1$(reject), -2
$x = -2$ exponent is even
$|-8 + 4 + 0 - 3 - 2| \Rightarrow |-9| \Rightarrow 9$