Additional Problems For Self Practice (APSP)

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

PART - I : PRACTICE TEST PAPER

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.
2. The test consists **30** questions, **4 marks** each.
3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

1. Which of the following sets is empty set ?
(1) $A = \{x : x \in N, 3 < x \le 4\}$ (2) $B = \{x : x \text{ is prime }, 90 < x < 96\}$
(3) $C = \{ x : x \text{ is an even prime}\}$ (4) $D = \{x : x \in \text{Rational numbers } \& \ 1 < x < 2\}$

2. Which of the following are pairs of equivalent sets ?
(1) $A = \{1,2,3\}$ $B = \{3, 6, 9\}$ (2) $A = \{0\}$ $B = \varphi$
(3) $A = \{-2, -1\}$ $B = \{1,2,3\}$ (4) $A = (x ; x \in N, x < 3\}$ $B = (x : x \in W , x < 3\}$

3. Which of the following is false ?
(1) Set of all triangles in a plane is infinite set
(2) Set of all lines parallel to the y-axis is infinite set
(3) Set of all points on the circumference of a circle is finite set
(4) Set of all positive integers greater than 100 is infinite set.

4. If $A = \{1,\{2,3\},4\}$. Find which of the following statement is false ?
(1) $\{2,3\} \in A$ (2) $\{\{2,3\}\} \subseteq A$ (3) $\{1,4\} \subseteq A$ (4) $\varphi \in A$

5. Which of the following sets are pairs of disjoint sets ?
(1) $A = \{1,2,3,4\}$ $B = \{x : x \text{ is prime number}, x \le 11\}$
(2) $A = \{x : x \in N , x \le 8\}$, $B \{x : x \text{ is prime number}, x \ge 3\}$
(3) $A = \{x : x \in N, x \text{ is even}\}$, $B = \{x : x \text{ is prime}, x \ge 4\}$
(4) $A = \{x : x \in N, x \text{ is odd}\}$ $C = \{x : x \text{ is composite number}\}$

6. If A and B are two sets containing 5 and 7 elements respectively, then maximum and minimum number of elements in $A \cup B$ respectively are –
(1) 7,5 (2) 12,5 (3) 7,0 (4) 12, 7

7. If $A = \{x : x \text{ is a prime number} < 25\}$ and $B = \{x : x \text{ is composite number} < 20\}$ then
(1) $n(A \cup B) = 20$ (2) $n(A \cap B) = 1$ (3) $n(A \cup B) = 18$ (4) $n(A \cup B') = 9$

8. If P(A) denotes power set of A, then which of the following is correct
(1) $n(P(P(P(\varphi)))) = 2$ (2) $n(P(P(P(P(\varphi))))) = 8$
(3) $n(P(P(\varphi)) + n(P(P(P(P(\varphi)))) = 18$ (4) $n(P(\varphi)) + n\,(P(P(\varphi))) = 4$

9. $A' \cup \{(A \cup B) \cap B'\} =$

(1) $A' \cap B'$ (2) $(A \cap B)'$ (3) $A' \cap B$ (4) $A \cup B'$

10. In a survey of 100 students, the number of student studying the various languages is found as, English only 18, English but not Hindi 23, English and Sanskrit 8, Sanskrit and Hindi 8, English 26, Sanskrit 48 and no language 24 then number of students studing Hindi are –
(1) 18 (2) 15 (3) 13 (4) 10

11. The number of positive integers from 1 to 1000, which are not divisible by 2, 3 or 5 are
(1) 266 (2) 265 (3) 267 (4) 734

12. There are three clubs A, B, C in a town with 40,50,60 members respectively. 10 people are members of all the three clubs, 80 members belong to only one club . Then the number of members which belongs to atleast two clubs are
(1) 20 (2) 30 (3) 55 (4) 40

13. If n(A) = 12, n (B) = 15, If x and y are minimum and maximum of $n(A' \cap B)$ then x + y =
(1) 12 (2) 15 (3) 18 (4) 27

14. If $A = \{(x,y) : x\, y \in R, x^2 + y^2 = 27\}$ and $B = \{(x,y) : x, y \in R, y^2 = 6x\}$ then $n(A \cap B)$ =
(1) 0 (2) 1 (3) 2 (4) 4

15. If (a + b, b – 3) = (5,1) then ab =
(1) 5 (2) 3 (3) 4 (4) 0

16. If X and Y are two sets, then $X \cap (X \cup Y)'$ equals.
(1) X (2) Y (3) φ (4) $X \cup Y$

17. If A = {1,2,3,4} B = {5,6,7} then which of the following is false ?
(1) $n(A \times B) = 12$ (2) $n(A \times A) = 16$ (3) $n(B \times B) = 9$ (4) $n(A \times A) + n(B \times B) = 28$

18. If $N_a = \{an : n \in N\}$, then $N_3 \cap N_5$ =
(1) N_3 (2) N_6 (3) N_{15} (4) N_5

19. The number of elements in the set $\{(x,y) : x^2 + 4y^2 = 45, x, y \in Z$, where Z is the set of all integers$\}$ is
(1) 0 (2) 4 (3) 8 (4) 12

20. If R = {(1,1), (2,2), (3,3), (4,4), (4,2), (2,4)} is a relation on set A = {1,2,3,4} then R is not
(1) Reflexive (2) symmetric (3) Transitive (4) Identity

21. Let A = {1,2,3,4 ....., 14} Define relation R from A to A by $R = \{(x,y) : y = 3x$, where $x, y \in A\}$ then range of R is
(1) {1,2,3,4} (2) {3,6,9,12} (3) {1,2,3,4,..... 14} (4) {2,4,6,8,10,12,14}

22. Let A and B two sets containing 3 elements and 4 elements respectively. The number of subsets of $A \times B$ having at most one element is
(1) 1 (2) 0 (3) 12 (4) 13

23. If a set contains m element and another set contains n elements. If 144 is the sum of number of subsets of both sets then (m,n) can be
(1) 4,6 (2) 7,2 (3) 7,4 (4) 8,2

24. Let A = {a, b, c}, which of the following is an equivalence relation on A ?
(1) $R_1 = \{(a,b) (b,c) (c,a) (a,a)\}$ (2) $R_2 = \{(c,a) (c,b) (c,c) (b,b)\}$
(3) $R_3 = \{(a,a) (b,b) (c,c) (a,b)\}$ (4) $R_4 = \{(a,a) (b,b) (c,c) (c,a) (a,c)\}$

25. The relation R defined on the set of real numbers as $R = \{(x,y)$ such that $|x - y| \le \frac{1}{3}$ for, $x, y \in R\}$ is

(1) Equivalence (2) Reflexive, symmetric but not transitive
(3) Reflexive and transitive but not symmetric (4) None of these

26. A relation on real number is given by $R = \{(x,y) : xy \geq 0, x\, y \in R\}$, then relation R is
(1) Reflexive, symmetric but not transitive (2) Reflexive transitive but not symmetric
(3)Symmetric, transitive but not reflexive (4) Equivalence

27. Let X = {1,2,3,4} . The number of different ordered pairs (Y,Z) that can be formed such that $Y \subseteq X$, $Z \subseteq X$ and $Y \cap Z$ is empty is
(1) 81 (2) 16 (3) 243 (4) 64

28. Let S be any non-empty set and P(s) be its power set .We define a relation R on P(s) by A R B to mean $A \subseteq B$ i.e. $R = \{(A,B) : A \subseteq B\}$ then R is
(1) Equivalence (2) reflexive, symmetric but not transtive
(3) Symmetric, transitive but not reflexive (4) Reflexive, transitive but not symmetric

29. An investigator interviewed 100 students to determine their preferences for the three drink : milk (M), coffee (C) and tea (T). He reported the following : 10 students had all the three drinks M, C and T; 20 had M and C; 30 had C and T; 25 had M and T; 12 had M only; 5 had C only; and 8 had T only . Find how many did not take any of the three drinks.
(1) 20 (2) 16 (3) 25 (4) 80

30. Let X = {1, 2, 3, 4, 5, 6, 7, 8, 9}. The number of pairs {A,B} such $A \subseteq X, B \subseteq X$, $A \neq B$ and $A \cap B = \{7,8\}$ are
(1) 2186 (2) 2187 (3) 128 (4) 127

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

*** Marked Questions may have more than one correct option.**
Marked Questions may have for Revision Questions.

1. Of the members of three athletic teams in a school 21 are in the cricket team, 26 are in the hockey team and 29 are in the football team. Among them, 14 play hockey and cricket, 15 play hockey and football, and 12 play football and cricket. Eight play all the three games. The total number of members in the three athletic teams is :
(1) 34 (2) 20 (3) 64 (4) 43

2. Among employee of a company taking vacations last years, 90% took vacations in the summer, 65% in the winter, 10% in the spring, 7% in the autumn, 55% in winter and summer, 8% in the spring and summer, 6% in the autumn and summer, 4% in the winter and spring , 4% in winter and autumn, 3% in the spring and autumn, 3% in the summer, winter and spring, 3% in the summer, winter and autumn, 2% in the summer, autumn and spring, and 2% in winter , spring and autumn. Percentage of employee that took vacations during every season.
(1) 4 (2) 3 (3) 2 (4) 8

3. If the number of elements in (A – B) – C, (B – C) – A, (C – A) – B and A ∩ B ∩ C is 10, 15, 20, and 5 respectively then the number of elements in (A Δ B) Δ C is
(1) 35 (2) 50 (3) 40 (4) 45

4. Let I be the set of integers , N the set of non-negative integers ; Np the set of non-positive integers ; E is the set of even integers and P is set of prime numbers . Then
(1) N ∩ Np = φ (2) I – N = Np (3) N Δ Np = I – {0} (4) E ∩ P = φ

5. If the function f(x) = $\sqrt{-5-6x-x^2}$ then which of the following is true ?
(1) domain of f(x) = [–5,–1] (2) domain of f(x) = (–5,–1)
(3) Range of f(x) = (0, 2) (4) Range of f(x) = [0,2]

6. Let f(x) = $\sqrt{x^2-4}$, g(x) = $\sqrt{x-3}$ and h(x) = $\sqrt{\frac{x^2-4}{x-3}}$ then which of the following is true
(1) domain of $\frac{f(x)}{g(x)}$ = (3,∞) (2) domain of h(x) = [–2,2] ∪ (3,∞)
(3) domain of $\frac{f(x)}{g(x)}$ = domain of h(x) (4) domain of $\frac{f(x)}{g(x)}$ ≠ domain of h(x)

7. Let m be a fixed non-zero integer. For integers a, b, we say that they are congruent modulo m iff a – b is divisible by m. We write this as a ≡ b (mod m). If R is the relation on the set Z of integers defined by aRb iff a ≡ b (mod m.) Then R is an
(1) reflexive relation (2) symmetric relation
(3) transitive relation (4) equivalence relation

Comprehension (8 to 10)
Let A [(1,2,3,4,5,6,7}. Let A_1 = {1,3,4}, A_2 = {5,6} and A_3 = {2,7} be subsets of A.

8. Relation $A_1 \times A_1$ on A is
(1) reflexive and symmetric (2) reflexive and transitive
(3) symmetric and transitive (4) none of these

9. Relation $(A_1 \times A_1) \cup (A_2 \times A_2) \cup (A_3 \times A_3)$ on A is
(1) reflexive and symmetric but not transitive (2) an equivalence relation
(3) symmetric and transitive but not reflexive (4) none of these

10. Number of proper subsets of A is
(1) 127 (2) 128 (3) 126 (4) None of these

11. Let A be a set containing n distinct elements. The number of sysmetric relations that can be difined on A is
(1) 2^{n^2} (2) n^{n^2} (3) $2^{(n^2+n)/2}$ (4) none of these

12. If two sets A and B are having 99 elements in common, then the number of elements common to each of the sets A × B and B × A are
(1) 2^{99} (2) 99^2 (3) 100 (4) 18

13. Let S = {1, 2, 3, 4}. The total number of unordered pairs of disjoint subsets of S is equal to
(1) 25 (2) 34 (3) 42 (4) 41

14. If set A = {1,2,3, ..., 100} and relation R = {(x,y) | x ≤ y, ∀ x, y ∈ A} then minimum number of ordered pairs required in R so that relation R is an equivalence relation is
(1) 100 (2) 4950 (3) 5000 (4) 4900

15. Consider the relation R on the set of real square matrices of order 3 R = {(A,B)| A = PBQ for some invertible matrices P,Q} then R is
(1) reflexive relation (2) symmetric relation
(3) transitive relation (4) equivalence relatio

APSP Answers

PART-I

1.	(2)	**2.**	(1)	**3.**	(3)	**4.**	(4)	**5.**	(3)	**6.**	(4)	**7.**	(4)
8.	(3)	**9.**	(2)	**10.**	(1)	**11.**	(1)	**12.**	(2)	**13.**	(3)	**14.**	(3)
15.	(3)	**16.**	(3)	**17.**	(4)	**18.**	(3)	**19.**	(2)	**20.**	(4)	**21.**	(2)
22.	(4)	**23.**	(3)	**24.**	(4)	**25.**	(2)	**26.**	(1)	**27.**	(1)	**28.**	(4)
29.	(1)	**30.**	(1)										

PART-II

1.	(4)	**2.**	(3)	**3.**	(2)	**4.**	(3)	**5.**	(1,4)	**6.**	(1,2,4)
7.	(1,2,3,4)			**8.**	(3)	**9.**	(2)	**10**	(1)	**11.**	(3)
12.	(2)	**13.**	(4)	**14.**	(2)	**15.**	(1,2,3,4)				