Special Practice Problems

Prepared by: sudhir jainam

~[JEE (Mains & Advanced)]~

Topics: Mathematical Reasoning & Statistics

~:Mathematical Reasoning:~

1. The inverse of the statement $(p \wedge \sim q) \to r$ is-
(1) $\sim(p \vee \sim q) \to \sim r$ (2) $(\sim p \wedge q) \to \sim r$
(3) $(\sim p \vee q) \to \sim r$ (4) None of these

2. $(\sim p \vee \sim q)$ is logically equivalent to-
(1) $p \wedge q$ (2) $\sim p \to q$
(3) $p \to \sim q$ (4) $\sim p \to \sim q$

3. The equivalent statement of $(p \leftrightarrow q)$ is-
(1) $(p \wedge q) \vee (p \vee q)$
(2) $(p \to q) \vee (q \to p)$
(3) $(\sim p \vee q) \vee (p \vee \sim q)$
(4) $(\sim p \vee q) \wedge (p \vee \sim q)$

4. If the compound statement $p \to (\sim p \vee q)$ is false then the truth value of p and q are respectively-
(1) T, T (2) T, F (3) F, T (4) F, F

5. The statement $(p \to \sim p) \wedge (\sim p \to p)$ is-
(1) a tautology
(2) a contradiction
(3) neither a tautology nor a contradiction
(4) None of these

6. Negation of the statement $(p \wedge r) \to (r \vee q)$ is-
(1) $\sim(p \wedge r) \to \sim(r \vee q)$ (2) $(\sim p \vee \sim r) \vee (r \vee q)$
(3) $(p \wedge r) \wedge (r \wedge q)$ (4) $(p \wedge r) \wedge (\sim r \wedge \sim q)$

7. The dual of the statement $\sim p \wedge [\sim q \wedge (p \vee q) \wedge \sim r]$ is-
(1) $\sim p \vee [\sim q \vee (p \vee q) \vee \sim r]$
(2) $p \vee [q \vee (\sim p \wedge \sim q) \vee r]$
(3) $\sim p \vee [\sim q \vee (p \wedge q) \vee \sim r]$
(4) $\sim p \vee [\sim q \wedge (p \wedge q) \wedge \sim r]$

8. Which of the following is correct-
(1) $(\sim p \vee \sim q) \equiv (p \wedge q)$
(2) $(p \to q) \equiv (\sim q \to \sim p)$
(3) $\sim(p \to \sim q) \equiv (p \wedge \sim q)$
(4) $\sim(p \leftrightarrow q) \equiv (p \to q) \vee (q \to p)$

9. The contrapositive of $p \to (\sim q \to \sim r)$ is-
(1) $(\sim q \wedge r) \to \sim p$ (2) $(q \to r) \to \sim p$
(3) $(q \vee \sim r) \to \sim p$ (4) None of these

10. The converse of $p \to (q \to r)$ is-
(1) $(q \wedge \sim r) \vee p$ (2) $(\sim q \vee r) \vee p$
(3) $(q \wedge \sim r) \wedge \sim p$ (4) $(q \wedge \sim r) \wedge p$

11. If p and q are two statement then $(p \leftrightarrow \sim q)$ is true when-
(1) p and q both are true
(2) p and q both are false
(3) p is false and q is true
(4) None of these

12. Statement $(p \wedge q) \to p$ is-
(1) a tautology (2) a contradiction
(3) neither (1) nor (2) (4) None of these

13 If statements p, q, r have truth values T, F, T respectively then which of the following statement is true-
(1) $(p \to q) \wedge r$ (2) $(p \to q) \vee \sim r$
(3) $(p \wedge q) \vee (q \wedge r)$ (4) $(p \to q) \to r$

14. If statement $p \to (q \vee r)$ is true then the truth values of statements p, q, r respectively-
(1) T, F, T (2) F, T, F
(3) F, F, F (4) All of these

15. Which of the following statement is a contradiction-
(1) $(p \wedge q) \wedge (\sim(p \vee q))$ (2) $p \vee (\sim p \wedge q)$
(3) $(p \to q) \to p$ (4) $\sim p \vee \sim q$

16. The negative of the statement "If a number is divisible by 15 then it is divisible by 5 or 3"
(1) If a number is divisible by 15 then it is not divisible by 5 and 3
(2) A number is divisible by 15 and it is not divisible by 5 or 3
(3) A number is divisible by 15 or it is not divisible by 5 and 3
(4) A number is divisible by 15 and it is not divisible by 5 and 3

17. If $x = 5$ and $y = -2$ then $x - 2y = 9$. The contrapositive of this statement is-
(1) If $x - 2y \neq 9$ then $x \neq 5$ or $y \neq -2$
(2) If $x - 2y \neq 9$ then $x \neq 5$ and $y \neq -2$
(3) If $x - 2y = 9$ then $x = 5$ and $y = -2$
(4) None of these

18. The negation of the statement "2 + 3 = 5 and 8 < 10" is-
(1) $2 + 3 \neq 5$ and $8 \not< 10$
(2) $2 + 3 \neq 5$ or $8 > 10$
(3) $2 + 3 \neq 5$ or $8 \geq 10$
(4) None of these

19. For any three simple statement p, q, r the statement $(p \wedge q) \vee (q \wedge r)$ is true when-
(1) p and r true and q is false
(2) p and r false and q is true
(3) p, q, r all are false
(4) q and r true and p is false

20. Which of the following statement is a tautology-
(1) $(\sim p \vee \sim q) \vee (p \vee \sim q)$
(2) $(\sim p \vee \sim q) \wedge (p \vee \sim q)$
(3) $\sim p \wedge (\sim p \vee \sim q)$
(4) $\sim q \wedge (\sim p \vee \sim q)$

21. Which of the following statement is a contradiction-
(1) $(\sim p \vee \sim q) \vee (p \vee \sim q)$
(2) $(p \rightarrow q) \vee (p \wedge \sim q)$
(3) $(\sim p \wedge q) \wedge (\sim q)$
(4) $(\sim p \wedge q) \vee (\sim q)$

22. The negation of the statement $q \vee (p \wedge \sim r)$ is equivalent to-
(1) $\sim q \wedge (p \rightarrow r)$ (2) $\sim q \wedge \sim(p \rightarrow r)$
(3) $\sim q \wedge (\sim p \wedge r)$ (4) None of these

23. Let Q be a non empty subset of N. and q is a statement as given below :-
q : There exists an even number $a \in Q$.
Negation of the statement q will be :-
(1) There is no even number in the set Q.
(2) Every $a \in Q$ is an odd number.
(3) (1) and (2) both
(4) None of these

24. The statement $\sim(p \rightarrow q) \leftrightarrow (\sim p \vee \sim q)$ is-
(1) a tautology
(2) a contradiction
(3) neither a tautology nor a contradiction
(4) None of these

25. Which of the following is equivalent to $(p \wedge q)$
(1) $p \rightarrow \sim q$ (2) $\sim(\sim p \wedge \sim q)$
(3) $\sim(p \rightarrow \sim q)$ (4) None of these

26. The dual of the following statement "Reena is healthy and Meena is beautiful" is-
(1) Reena is beaufiful and Meena is healthy
(2) Reena is beautiful or Meena is healthy
(3) Reena is healthy or Meena is beutiful
(4) None of these

27. If p is any statement, t and c are a tautology and a contradiction respectively then which of the following is not correct-
(1) $p \wedge t \equiv p$ (2) $p \wedge c \equiv c$
(3) $p \vee t \equiv c$ (4) $p \vee c \equiv p$

28. If $S^*(p, q)$ is the dual of the compound statement S(p, q) then $S^*(\sim p, \sim q)$ is equivalent to-
(1) $S(\sim p, \sim q)$ (2) $\sim S(p, q)$
(3) $\sim S^*(p, q)$ (4) None of these

29. If p is any statement, t is a tautology and c is a contradiction then which fo the following is not correct-
(1) $p \wedge (\sim c) \equiv p$
(2) $p \vee (\sim t) \equiv p$
(3) $t \vee c \equiv p \vee t$
(4) $(p \wedge t) \vee (p \vee c) \equiv (t \wedge c)$

30. If p, q, r are simple statement with truth values T, F, T respectively then the truth value of $((\sim p \vee q) \wedge \sim r) \rightarrow p$ is-
(1) True
(2) False
(3) True if r is false
(4) True if q is true

31. Which of the following is wrong-
(1) $p \vee \sim p$ is a tautology
(2) $\sim(\sim p) \leftrightarrow p$ is a tautology
(3) $p \wedge \sim p$ is a contradiction
(4) $((p \wedge p) \rightarrow q) \rightarrow p$ is a tautology

32. The statement "If $2^2 = 5$ then I get first class" is logically equivalent to-

(1) $2^2 = 5$ and I do not get first class

(2) $2^2 = 5$ or I do not get first class

(3) $2^2 \neq 5$ or I get first class

(4) None of these

33. If statement $(p \vee \sim r) \rightarrow (q \wedge r)$ is false and statement q is true then statement p is-

(1) true (2) false

(3) may be true or false (4) None of these

34. Which of the following statement are not logically equivalent-

(1) $\sim(p \vee \sim q)$ and $(\sim p \wedge q)$

(2) $\sim(p \rightarrow q)$ and $(p \wedge \sim q)$

(3) $(p \rightarrow q)$ and $(\sim q \rightarrow \sim p)$

(4) $(p \rightarrow q)$ and $(\sim p \wedge q)$

35. Consider the following statements

p : Virat kohli plays cricket.

q : Virat kohli is good at maths

r : Virat kohli is successful.

then negation of the statement "If virat kohli plays cricket and is not good at maths then he is successful" will be :-

(1) $\sim p \wedge (q \wedge r)$ (2) $(\sim p \vee q) \wedge r$

(3) $p \wedge (\sim q \wedge \sim r)$ (4) None of these

36. Let p statement "If $2 > 5$ then earth will not rotate" and q be the statement "$2 \neq 5$ or earth will not rotate".

Statement–1 : p and q are equivalent.

Statement–2 : $m \rightarrow n$ and $\sim m \vee n$ are equivalent.

(1) Statement–1 is true, Statement–2 is true; Statement–2 is not the correct explanation of Statement–1.

(2) Statement–1 is false, Statement–2 is true.

(3) Statement–1 is true, Statement–2 is false.

(4) Statement–1 is true, Statement–2 is true; Statement–2 is the correct explanation of Statement–1.

37. Which of the following is a tautology :-

(1) $[(\sim p \wedge p) \rightarrow q] \longrightarrow (p \wedge p)$

(2) $[(\sim p \wedge p) \rightarrow q] \longrightarrow (\sim p \rightarrow p)$

(3) $[(\sim p \wedge p) \rightarrow q] \longrightarrow (p \rightarrow p)$

(4) None of these

38. Negation of the statement "No one in the class is fond of music" is :-

(1) everyone in the class is fond of music.

(2) Some of the students in the class are fond of music.

(3) There exists a student in the class who is fond of music.

(4) (2) and (3) both

Answer-Key:

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	3	4	2	2	4	3	2	1	1	3	1	4	4	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	4	1	3	4	1	3	1	3	3	3	3	3	2	4	1
Que.	31	32	33	34	35	36	37	38							
Ans.	4	3	3	4	3	4	3	4							

Previous years Questions:

1. The statement $p \rightarrow (q \rightarrow p)$ is equivalent

[AIEEE-2008]

(1) $p \rightarrow (p \rightarrow q)$ (2) $p \rightarrow (p \vee q)$

(3) $p \rightarrow (p \wedge q)$ (4) $p \rightarrow (p \leftrightarrow q)$

2. Let p be the statement "x is an irrational number", q be the statement "y is a trascendental number", and r be the statement "x is a rational number iff y is a transcendental number". [AIEEE-2008]

Statement –1 : r is equivalent to either q or p.

Statement –2 : r is equivalent to $(p \leftrightarrow \sim q)$

(1) Statement –1 is false, Statement –2 is true

(2) Statement–1 is true, Statement–2 is false

(3) Statement–1 is true, Statement–2 is true; Statement–2 is a correct explanation for Statement–1

(4) Statement–1 is true, Statement–2 is true; Statement–2 is not a correct explanation for Statement–1

3. **Statement–1 :** $\sim(p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$.

Statement–2 : $\sim(p \leftrightarrow \sim q)$ is a tautology.

[AIEEE-2009]

(1) Statement–1 is true, Statement–2 is false.

(2) Statement–1 is false, Statement–2 is true.

(3) Statement–1 is true, Statement–2 is true ; Statement–2 is a correct explanation for Statement–1.

(4) Statement–1 is true, Statement–2 is true ; Statement–2 is not a correct explanation for statement–1.

4. Let S be a non-empty subset of R.

Consider the following statement :

p : There is a rational number $x \in S$ such that $x > 0$

which of the following statements is the negation of the statement p ? [AIEEE-2010]

(1) There is a rational number $x \in S$ such that $x \leq 0$

(2) There is no rational number $x \in S$ such that $x \leq 0$

(3) Every rational number $x \in S$ satisfies $x \leq 0$

(4) $x \in S$ and $x \leq 0 \Rightarrow$ x is not rational

5. Consider the following statements

p : Suman is brilliant

q : Suman is rich

r : Suman is honest

The negation of the statement "Suman is brilliant and dishonest if and only if Suman is rich" can be expressed as :- [AIEEE-2011]

(1) $\sim q \leftrightarrow \sim p \wedge r$ (2) $\sim (p \wedge \sim r) \leftrightarrow q$

(3) $\sim p \wedge (q \leftrightarrow \sim r)$ (4) $\sim (q \leftrightarrow (p \wedge \sim r))$

6. The only statement among the followings that is a tautology is : [AIEEE-2011]

(1) $q \rightarrow [p \wedge (p \rightarrow q)]$

(2) $p \wedge (p \vee q)$

(3) $p \vee (p \wedge q)$

(4) $[p \wedge (p \rightarrow q)] \rightarrow q$

7. The negation of the statement [AIEEE-2012]

"If I become a teacher, then I will open a school", is :

(1) I will not become a teacher or I will open a school.

(2) I will become a teacher and I will not open a school.

(3) Either I will not become a teacher or I will not open a school.

(4) Neither I will become a teacher nor I will open a school.

8. Consider :

Statement-I : $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is a fallacy.

Statement-II : $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a tuatology. **[JEE-MAINS-2013]**

(1) Statement-I is true, Statement-II is true; statement-II is a **correct** explanation for Statement-I.

(2) Statement-I is true, Statement-II is true; statement-II is **not** a correct explanation for Statement-I.

(3) Statement-I is true, Statement-II is false.

(4) Statement-I is false, Statement-II is true.

9. The statement $\sim(p \leftrightarrow \sim q)$ is : **[JEE(Main)-2014]**

(1) equivalent to $p \leftrightarrow q$

(2) equivalent to $\sim p \leftrightarrow q$

(3) a tautology (4) a fallacy

10. The negation of $\sim s \vee (\sim r \wedge s)$ is equivalent to : **[JEE(Main)-2015]**

(1) $s \vee (r \vee \sim s)$ (2) $s \wedge r$

(3) $s \wedge \sim r$ (4) $s \wedge (r \wedge \sim s)$

11. The Boolean Expression $(p \wedge \sim q) \vee q \vee (\sim p \wedge q)$ is equivalent to :- **[JEE(Main)-2016]**

(1) $p \vee \sim q$ (2) $\sim p \wedge q$

(3) $p \wedge q$ (4) $p \vee q$

12. The following statement

$(p \rightarrow q) \rightarrow [(\sim p \rightarrow q) \rightarrow q]$ is :

[JEE(Main)-2017]

(1) a fallacy

(2) a tautology

(3) equivalent to $\sim p \rightarrow q$

(4) equivalent to $p \rightarrow \sim q$

Previous years Questions Answer-Key:

Que.	1	2	3	4	5	6	7	8	9	10	11	12			
Ans.	2	1	1	3	2,4	4	2	2	1	2	4	2			

~:Statistics:~

Arithmetic mean, weighted mean, Combined mean

1. Mean of the first n terms of the A.P. a, (a + d), (a + 2d), ... is-

(1) $a+\frac{nd}{2}$ (2) $a+\frac{(n-1)d}{2}$

(3) a + (n – 1) d (4) a + nd

2. The A.M. of first n even natural number is -

(1) n(n + 1) (2) $\frac{n+1}{2}$ (3) $\frac{n}{2}$ (4) n + 1

3. The A.M. of ${}^nC_0$, ${}^nC_1$, ${}^nC_2$, ...${}^nC_n$ is -

(1) $\frac{2^n}{n}$ (2) $\frac{2^{n+1}}{n}$ (3) $\frac{2^n}{n+1}$ (4) $\frac{2^{n+1}}{n+1}$

4. If the mean of numbers 27, 31, 89, 107, 156 is 82, then the mean of numbers 130, 126, 68, 50, 1 will be-

(1) 80 (2) 82 (3) 75 (4) 157

5. If the mean of n observations $x_1, x_2, ...x_n$ is $\bar{x}$, then the sum of deviations of observations from mean is :-

(1) 0 (2) $n\bar{x}$

(3) $\frac{\bar{x}}{n}$ (4) None of these

6. The mean of 9 terms is 15. if one new term is added and mean become 16, then the value of new term is :-

(1) 23 (2) 25 (3) 27 (4) 30

7. If the mean of first n natural numbers is equal to $\frac{n+7}{3}$, then n is equal to-

(1) 10 (2) 11

(3) 12 (4) none of these

8. The mean of first three terms is 14 and mean of next two terms is 18. The mean of all the five terms is-

(1) 15.5 (2) 15.0 (3) 15.2 (4) 15.6

9. If the mean of five observations x, x + 2 , x + 4, x+ 6 and x + 8 is 11, then the mean of last three obsevations is-

(1) 11 (2) 13 (3) 15 (4) 17

10. The mean of a set of numbers is $\bar{x}$. If each number is decreased by λ, the mean of the new set is-

(1) $\bar{x}$ (2) $\bar{x}+\lambda$ (3) $\lambda-\bar{x}$ (4) $\bar{x}-\lambda$

11. The mean of 50 observations is 36. If its two observations 30 and 42 are deleted, then the mean of the remaining observations is-

(1) 48 (2) 36

(3) 38 (4) none of these

12. In a frequency dist. , if d_i is deviation of variates from a number ℓ and mean = $\ell+\frac{\Sigma f_i d_i}{\Sigma f_i}$, then ℓ is :-

(1) Lower limit

(2) Assumed mean

(3) Number of observation

(4) Class interval

13. The A.M. of n observation is $\bar{x}$. If the sum of n – 4 observations is K, then the mean of remaining observations is-

(1) $\frac{\bar{x}-K}{4}$ (2) $\frac{n\bar{x}-K}{n-4}$

(3) $\frac{n\bar{x}-K}{4}$ (4) $\frac{n\bar{x}-(n-4)K}{4}$

14. The mean of values $1,\frac{1}{2},\frac{1}{3},.....\frac{1}{n}$ which have frequencies 1, 2, 3, ... n resp., is :-

(1) $\frac{2n+1}{3}$ (2) $\frac{2}{n}$ (3) $\frac{n+1}{2}$ (4) $\frac{2}{n+1}$

15. The sum of squares of deviation of variates from their A.M. is always :-

(1) Zero

(2) Minimum

(3) Maximum

(4) Nothing can be said

16. If the mean of following feq. dist. is 2.6, then the value of f is :-

x_i	1	2	3	4	5
f_i	5	4	f	2	3

(1) 1 (2) 3

(3) 8 (4) None of these

17. The weighted mean (W.M.) is computed by the formula ?

(1) W.M. = $\frac{\Sigma x_i}{\Sigma w_i}$ (2) W.M. = $\frac{\Sigma w_i}{\Sigma x_i}$

(3) W.M. = $\frac{\Sigma w_i x_i}{\Sigma x_i}$ (4) W.M. = $\frac{\Sigma w_i x_i}{\Sigma w_i}$

18. The weighted mean of first n natural numbers when their weights are equal to corresponding natural number, is :-

(1) $\frac{n+1}{2}$ (2) $\frac{2n+1}{3}$

(3) $\frac{(n+1)(2n+1)}{6}$ (4) None of these

19. The average income of a group of persons is $\bar{x}$ and that of another group is $\bar{y}$. If the number of persons of both group are in the ratio 4 : 3, then average income of combined group is :-

(1) $\frac{\bar{x}+\bar{y}}{7}$ (2) $\frac{3\bar{x}+4\bar{y}}{7}$

(3) $\frac{4\bar{x}+3\bar{y}}{7}$ (4) None of these

20. In a group of students, the mean weight of boys is 65 kg. and mean weight of girls is 55 kg. If the mean weight of all students of group is 61 kg, then the ratio of the number of boys and girls in the group is :-

(1) 2 : 3 (2) 3 : 1 (3) 3 : 2 (4) 4 : 3

Median, Mode

21. The median of an arranged series of n even observations, will be :-

(1) $\left(\frac{n+1}{2}\right)$ th term

(2) $\left(\frac{n}{2}\right)$ th term

(3) $\left(\frac{n}{2}+1\right)$ th term

(4) Mean of $\left(\frac{n}{2}\right)$ th and $\left(\frac{n}{2}+1\right)$ th terms

22. The median of the numbers 6, 14, 12, 8, 10, 9, 11, is :-

(1) 8 (2) 10 (3) 10.5 (4) 11

23. Median of the following freq. dist.

x_i	3	6	10	12	7	15
f_i	3	4	2	8	13	10

(1) 7 (2) 10

(3) 8.5 (4) None of these

24. Median is independent of change of :-

(1) only Origin

(2) only Scale

(3) Origin and scale both

(4) Neither origin nor scale

25. A series which have numbers three 4's, four 5's, five 6's, eight 7's, seven 8's and six 9's then the mode of numbers is :-

(1) 9 (2) 8 (3) 7 (4) 6

26. Mode of the following freqency distribution

x :	4	5	6	7	8
f :	6	7	10	8	3

(1) 5 (2) 6 (3) 8 (4) 10

27. The mode of the following freq. dist is :-

Class	1–10	11–20	21–30	31–40	41–50
f_i	5	7	8	6	4

(1) 24 (2) 23.83

(3) 27.16 (4) None of these

Symmetric and asymmetric distribution, Range

28. For a normal dist :-

(1) mean = median

(2) median = mode

(3) mean = mode

(4) mean = median = mode

29. The relationship between mean, median and mode for a moderately skewed distribution is-

(1) mode = median – 2 mean

(2) mode = 2 median – mean

(3) mode = 2 median – 3 mean

(4) mode = 3 median – 2 mean

30. The range of observations 2, 3, 5, 9, 8, 7, 6, 5, 7, 4, 3 is :-

(1) 6 (2) 7 (3) 5.5 (4) 11

Mean Deviation

31. The mean deviation of a frequency dist. is equal to :-

(1) $\frac{\Sigma d_i}{\Sigma f_i}$ (2) $\frac{\Sigma |d_i|}{\Sigma f_i}$

(3) $\frac{\Sigma f_i d_i}{\Sigma f_i}$ (4) $\frac{\Sigma f_i |d_i|}{\Sigma f_i}$

32. Mean deviation from the mean for the observation $-1, 0, 4$ is-

(1) $\sqrt{\frac{14}{3}}$ (2) $\frac{2}{3}$

(3) 2 (4) none of these

33. Mean deviation of the observations 70, 42, 63, 34, 44, 54, 55, 46, 38, 48 from median is :-

(1) 7.8 (2) 8.6

(3) 7.6 (4) 8.8

34. Mean deviation of 5 observations from their mean 3 is 1.2, then coefficient of mean deviation is :-

(1) 0.24 (2) 0.4

(3) 2.5 (4) None of these

35. The mean deviation from median is

(1) greater than the mean deviation from any other central value

(2) less than the mean deviation from any other central value

(3) equal to the mean deviation from any other central value

(4) maximum if all values are positive

Variance and Standard Deviation

36. The variate x and u are related by $u = \frac{x-a}{h}$ then correct relation between σ_x and σ_u is :-

(1) $\sigma_x = h\sigma_u$ (2) $\sigma_x = h + \sigma_u$

(3) $\sigma_u = h\sigma_x$ (4) $\sigma_u = h + \sigma_x$

37. The S.D. of the first n natural numbers is-

(1) $\sqrt{\frac{n^2-1}{2}}$ (2) $\sqrt{\frac{n^2-1}{3}}$

(3) $\sqrt{\frac{n^2-1}{4}}$ (4) $\sqrt{\frac{n^2-1}{12}}$

38. The variance of observations 112, 116, 120, 125, 132 is :-

(1) 58.8 (2) 48.8

(3) 61.8 (4) None of these

39. If $\sum_{i=1}^{10}(x_i - 15) = 12$ and $\sum_{i=1}^{10}(x_i - 15)^2 = 18$ then the S.D. of observations $x_1, x_2 \ldots\ldots\ldots x_{10}$ is :-

(1) $\frac{2}{5}$ (2) $\frac{3}{5}$

(3) $\frac{4}{5}$ (4) None of these

40. The S.D. of 7 scored 1, 2, 3, 4, 5, 6, 7 is-

(1) 4 (2) 2

(3) $\sqrt{7}$ (4) none of these

41. The variance of series a, a + d, a + 2d, ..., a + 2nd is :-

(1) $\frac{n(n+1)}{2}d^2$ (2) $\frac{n(n+1)}{3}d^2$

(3) $\frac{n(n+1)}{6}d^2$ (4) $\frac{n(n+1)}{12}d^2$

42. Variance is independent of change of-

(1) only origin

(2) only scale

(3) origin and scale both

(4) none of these

43. If the coefficient of variation and standard deviation of a distribution are 50% and 20 respectively, then its mean is-

(1) 40 (2) 30

(3) 20 (4) None of these

44. If each observation of a dist. whose S.D. is σ, is increased by λ, then the variance of the new observations is -

(1) σ (2) $\sigma+\lambda$ (3) σ^2 (4) $\sigma^2+\lambda$

45. The variance of 2, 4, 6, 8, 10 is-

(1) 8 (2) $\sqrt{8}$

(3) 6 (4) none of these

46. If each observation of a dist., whose variance is σ^2 , is multiplied by λ, then the S.D. of the new new observations is-

(1) σ (2) $\lambda\sigma$

(3) $|\lambda|\sigma$ (4) $\lambda^2\sigma$

47. The standard deviation of variate x_i is σ. Then standard deviation of the variate $\frac{ax_i+b}{c}$, where a , b, c are constants is-

(1) $\left(\frac{a}{c}\right)\sigma$ (2) $\left|\frac{a}{c}\right|\sigma$

(3) $\left(\frac{a^2}{c^2}\right)\sigma$ (4) None of these

Answer-Key:

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	2	4	3	3	1	2	2	4	2	4	2	2	3	4	2	1	4	2	3	3
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	4	2	3	4	3	2	2	4	4	2	4	3	2	2	2	1	4	2	2	2
Que.	41	42	43	44	45	46	47													
Ans.	2	1	1	3	1	3	2													

1. The mean of Mathematics marks of 100 students of a class is 72. If the number of boys is 70 and the mean of their marks is 75. Then the mean of the marks of girls in the class will be- [AIEEE-2002]

(1) 60 (2) 62 (3) 65 (4) 68

2. In an experiment with 15 observations on x, the following results were available $\sum x^2 = 2830$, $\sum x = 170$. One observation that was 20 was found to be wrong and it was replaced by its correct value 30. Then the corrected variance is- [AIEEE-2003]

(1) 8.33 (2) 78

(3) 188.66 (4) 177.33

3. The median of a set of 9 distinct observations is 20.5. If each of the largest four observations of the set is increased by 2, then the median of the new set- [AIEEE-2003]

(1) remains the same as that of the original set

(2) is increased by 2

(3) is decreased by 2

(4) is two times the original median

4. Consider the following statements- [AIEEE-2004]

(a) Mode can be computed from histogram

(b) median is not independent of change of scale

(c) variance is independent of change of origin and scale.

which of these are correct-

(1) only (a) and (b) (2) only (b)

(3) only (a) (4) (a), (b) and (c)

5. In a series of 2n observations, half of them equal a and remaining half equal –a. If the standard deviation of the observations is 2, then |a| equals- [AIEEE-2004]

(1) 2 (2) $\sqrt{2}$ (3) 1/n (4) $\sqrt{2}/n$

6. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately- [AIEEE-2005]

(1) 24.0 (2) 25.5 (3) 20.5 (4) 22.0

7. Let $x_1, x_2, \ldots\ldots, x_n$ be n observations such that $\sum x_i^2 = 400$ and $\sum x_i = 80$. Then a possible value of n among the following is- [AIEEE-2005]

(1) 12 (2) 9 (3) 18 (4) 15

8. Suppose a population A has 100 observations 101, 102, ... 200 and other population B has 100 observations 151, 152, ... 250. If V_A and V_B represent the variance of two population respectively then V_A/V_B is- [AIEEE-2006]

(1) 9/4 (2) 4/9 (3) 2/3 (4) 1

9. The average marks of boys in a class 52 and that of girls is 42. The average marks of boys and girls combined is 50 then the parcentage of boys in the class is- [AIEEE-2007]

(1) 20 (2) 80 (3) 60 (4) 40

10. The mean of the numbers a, b, 8, 5, 10 is 6 and the variance is 6.80 then which one of the following gives possible values of a and b ? [AIEEE-2008]

(1) a = 0, b = 7 (2) a = 5, b = 2

(3) a = 1, b = 6 (4) a = 3, b = 4

11. If the mean deviation of the numbers 1, 1 + d, 1 + 2d, ..., 1 + 100d from their mean is 255, then that d is equal to- [AIEEE-2009]

(1) 10.1 (2) 20.2

(3) 10.0 (4) 20.0

12. **Statement–1 :** The variance of first n even natural numbers is $\frac{n^2-1}{4}$

Statement–2 : The sum of first n natural numbers is $\frac{n(n+1)}{2}$ and the sum of squares of first n natural numbers is $\frac{n(n+1)(2n+1)}{6}$.

[AIEEE-2009]

(1) Statement–1 is true, Statement–2 is false.
(2) Statement–1 is false, Statement–2 is true.
(3) Statement–1 is true, Statement–2 is true ; Statement–2 is a correct explanation for Statement–1.
(4) Statement–1 is true, Statement–2 is true ; Statement–2 is not a correct explanation for statement–1.

13. For two data sets each of size is 5, the variances are given to be 4 and 5 and the corresponding measn are given to be 2 and 4 respectively, then the variance of the combined data set is :-

[AIEEE-2010]

(1) $\frac{5}{2}$ (2) $\frac{11}{2}$ (3) 6 (4) $\frac{13}{2}$

14. If the mean deviation about the median of the numbers a, 2a, ..., 50a is 50, then |a| equals:-

[AIEEE-2011]

(1) 4 (2) 5 (3) 2 (4) 3

15. A scientist is weighing each of 30 fishes. Their mean weight worked out is 30 gm and a standard deviation of 2 gm. Later, it was found that the measuring scale was misaligned and always under reported every fish weight by 2 gm. The correct mean and standard deviation (in gm) of fishes are respectively :

[AIEEE-2011]

(1) 28, 4 (2) 32, 2 (3) 32, 4 (4) 28, 2

16. Let $x_1, x_2, \ldots, x_n$ be n observations, and let $\bar{x}$ be their arithmetic mean and σ^2 be their variance. [AIEEE-2012]

Statement–1 : Variance of $2x_1, 2x_2, \ldots, 2x_n$ is $4\sigma^2$.

Statement–2 : Arithmetic mean of $2x_1, 2x_2, \ldots, 2x_n$ is $4\bar{x}$.

(1) Statement–1 is true, Statement–2 is false.
(2) Statement–1 is false, Statement–2 is true.
(3) Statement–1 is true, Statement–2 is true ; Statement–2 is a correct explanation for Statement–1.
(4) Statement–1 is true, Statement–2 is true ; Statement–2 is not a correct explanation for Statement–1.

17. All the students of a class performed poorly in Mathematics. The teacher decided to give grace marks of 10 to each of the students. Which of the following statistical measures will not change even after the grace marks were given? [JEE-MAINS-2013]

(1) mean (2) median
(3) mode (4) variance

18. The variance of first 50 even natural numbers is :- [JEE(Main)-2014]

(1) $\frac{833}{4}$ (2) 833 (3) 437 (4) $\frac{437}{4}$

19. The mean of the data set comprising of 16 observations is 16. If one of the observation valued 16 is deleted and three new observations valued 3, 4 and 5 are added to the data, then the mean of the resultant data, is : [JEE(Main)-2015]

(1) 15.8 (2) 14.0
(3) 16.8 (4) 16.0

20. If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true ? [JEE(Main)-2016]

(1) $3a^2 - 23a + 44 = 0$
(2) $3a^2 - 26a + 55 = 0$
(3) $3a^2 - 32a + 84 = 0$
(4) $3a^2 - 34a + 91 = 0$

PREVIOUS YEARS QUESTIONS ANSWER-KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	3	2	1	1	1	1	3	4	2	4	1	2	2	1	2	1	4	2	2	3