

BUDHA DAL PUBLIC SCHOOL PATIALA
FIRST TERM EXAMINATION (6 September 2024)

Class - XI

Paper-Applied Mathematics

M.M. 80

Time: 3hrs.

General Instructions:

1. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer type questions of 2 marks each.
4. Section C has 6 Short Answer type questions of 3 marks each.
5. Section D has 4 Long Answer type questions of 5 marks each.
6. Section E has 3 case based studies of 4 marks each.

Section - A

1. Which of the following number is equivalent to 125_7 ?
a) 1111011_2 b) 1111101_2 c) 1101101_2 d) 111001_2
2. A can do a piece of work in 12 days and B can do same work in 16 days. A started the work alone and B joins the work after x days. If the work is completed in 9 days, then x is
a) 4 b) 5 c) 3 d) 6
3. If A and B are two sets, then $A \cap (A \cup B)$ is
a) A b) B c) \emptyset d) $A \cap B$
4. Number of proper subsets of a set containing 4 elements is
a) 4^2 b) $4^2 - 1$ c) 2^4 d) $2^4 - 1$
5. If $R = \{(x, y); x, y \in N, x + 2y = 21\}$, then range of R is
a) $\{1, 2, 3 \dots 7, 8\}$ b) $\{1, 2, 3 \dots 9, 10\}$ c) $\{1, 3, 5 \dots 19\}$ d) $\{1, 3, 5, 7 \dots 15\}$
6. Given $R = \{(x, y): x, y \in Z, y = x - 3\}$ then which ordered pair belongs to R?
a) (1, 4) b) (0, 3) c) (5, 2) d) (-4, 1)
7. If 9 times 9th term of AP is equal to 13 times the 13th term, then 22nd term of A.P. is
a) 0 b) 22 c) 220 d) 198
8. First and last terms of A.P. are 1 and 11. If sum of its terms is 36, then number of terms will be
a) 5 b) 6 c) 7 d) 8
9. Sum of an infinite G.P. $10, -8, 6.4, \dots$ is
a) $\frac{50}{9}$ b) $\frac{48}{9}$ c) $\frac{42}{9}$ d) $\frac{40}{9}$

10. If sum of first two terms of an infinite G.P. is 1 and every term is twice the sum of all the successive terms, then its first term is
 a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{3}{4}$ d) $\frac{1}{4}$
11. First term of G.P. is 5 and common ratio is -5 . Which term of G.P. is 3125 ?
 a) 6th b) 8th c) 5th d) 4th
12. In a certain language 'MADRAS' is coded as 'NBESBT', how is 'BOMBAY' coded?
 a) CPNCBX b) CPNCBZ c) CPOCBZ d) CQOCBZ
13. Find odd man out in
 a) sphere b) circle c) cylinder d) cube
14. Pointing towards a boy, Veena said, "He is the son of only son of my grandfather". How is that boy related to Veena?
 a) Uncle b) Brother c) Cousin d) none of these
15. If Mean is 27.5, mode is 30, S.D. is 7.2. Find Karl Pearson's coefficient of Skewness.
 a) 0.347 b) -0.347 c) -0.467 d) -0.437
16. In a frequency curve of scores, if Mode > Mean then distribution is
 a) symmetric b) normal c) negative skewed d) positively skewed
17. Characteristic of $\log 0.0003799$ is
 a) 3 b) $\bar{3}$ c) 4 d) $\bar{4}$
18. The product $\sqrt[3]{2} \cdot \sqrt[4]{2} \cdot \sqrt[12]{32}$ equals
 a) $\sqrt{2}$ b) 2 c) $\sqrt[12]{2}$ d) $\sqrt[32]{2}$

Assertion & Reasoning Questions

The following questions consists of two statements - Assertion (A) and Reason (R). Answer the question selecting appropriate option given below:

- a) Both A and R are true and R is correct explanation for R.
 b) Both A and R are true but R is not correct explanation for R.
 c) A is true but R is false.
 d) A is false but R is true.
19. Assertion (A) : If the n^{th} term of a sequence is $a_n = 4n + 7$ then it is an A.P. with $d = 7$
 Reason (R) : A sequence is an AP iff its n^{th} term is of the form $a_n = An + B$. In such a case common difference is A.
20. Assertion (A) : The average of first n natural numbers is $\left(\frac{n+1}{2}\right)$
 Reason (R) : The sum of first n natural numbers is $\frac{n(n+1)}{2}$

Section - B

21. What was the day of 15th August 1947?
22. If $A = \{1, 2, 3, 4, 5\}$, $B = \{2, 3, 4\}$, $C = \{2, 4, 5\}$ state which of the following statements are true/false
 a) $\phi \subset B$ b) $B = C$ c) $A \subset B$ d) $B \subset A$
23. Evaluate $3 \times 3^{1/2} \times 3^{1/4} \times 3^{1/8} \times \dots \infty$
24. In the following question, which of the conclusion is T/F on the basis of given statement?
 Statement I : Some cars are jeeps
 Statement II : All trucks are cars
 Conclusion I : No truck is jeep
 Conclusion II : Some jeeps are cars.
25. Find mean deviation about mean of 1, 3, 7, 9, 10, 12

Section - C

26. Find coefficient of correlation between X and Y for following data:

X	5	4	3	2	1
Y	4	2	10	8	6

27. Find sum of first n terms of the series $5 + 55 + 555 + \dots$
28. Sum of n - terms of two A.P's are in the ratio $(5n + 4) : (9n + 6)$. Find ratio of their 18th term.
29. If $A = \{1, 2, 3\}$, $B = \{1, 2, 3, 4\}$, $R = \{(x, y) : (x, y) \in A \times B, y = x + 1\}$ then
 a) Write domain of R
 b) Write range of R
 c) Represent R by an arrow diagram.
30. Two trains are running in same direction at 90 km/hr and 126 km/hr respectively. The length of first train is 130m and time to cross each other is 25 seconds from the time they meet. Find the length of the second train.
31. Draw a suitable, Venn diagram for each of following :
 a) $(A \cup B)'$ b) $A \cap B$ c) $A' \cap B'$

Section - D

32. With corona virus threatening to run riot in India, prevention appears to be the best cure available so far. A survey was conducted on 5 persons to see if proper precautions were being taken by people and following points were observed
 a) 15 persons used face masks.
 b) 14 consciously maintained social distancing
 c) 5 used face masks and washed their hands regularly
 d) 9 maintained social distancing and used face masks
 e) 3 were practicing all the three measures
 f) 4 maintained social distancing and washing hands regularly
 g) 4 practised only social distancing norms.

Assuming that everyone took atleast one of the precautionary measures, find

- How many exercised only washing hand as precautionary measure?
- how many practiced social distancing and washing hand but not wearing masks?
- how many exercised only wearing masks?

33. Seven boys A, B, C, D, E, F and G are standing in a straight line facing towards North. F is to the immediate left of D. G is between A and E. F and A have one boy between them. E and C have two boys between them. C and B have three boys between them.

- Write the standing arrangement
- Who is third to right of E?
- Who are the neighbours of C?
- Which boy is standing exactly in the middle?

34. Find mean, variance and S.D. for

Classes	0-30	30-60	60-90	90-120	120-150	150-180	180-210
Frequency	2	3	5	10	3	5	2

35. The lengths of three unequal edges of a rectangular solid block are in G.P. The volume of the block is 216 cm^3 and its surface area is 252 cm^2 . Find the length of the longest edge.

Section - E (Case Studies)

36. A and B together can do a piece of work in 24 days, B and C together can do the same piece of work in 40 days. C and A together can do it in 30 days.

Based on the above information, answer the following questions:

- Find the number of days in which A, B and C working together can finish the work.
- Find the number of days in which A alone can finish the work.
- Find the number of days in which B and C alone can finish the work.

37. The number of bacteria in a certain culture doubles every hour. Given that the number of bacteria present at the end of 4th hour was 160000.

Based on the above information, answer the following questions:

- Find the number of bacteria present originally.
- Find the number of bacteria present at the end of 7th hour.
- Find the sum of number of bacteria present originally to the end of 8th hour.

38. Coding is a method of converting information in the form of letters, words or phrases into same or other form for the purpose of secrecy:

Decoding is a method of converting the message sent by a source into the original form.

Based on the above information, answer the following questions:

- In a certain language if 'MATHEMATICS' is coded as 'PDWKHPDWLFV'. How is 'STATISTICS' coded?
- In a certain language if 'INCOME' is coded as 'HOBPLF'. How is 'EXPENSES' coded?
- In a certain language if 'SPHERE' is coded as 'EREHPS'. How is 'SQUARE' coded?