BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS

SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

ANNUAL EXAMINATION 2024-25

APPLIED MATHEMATICS (241)

INDIAN PUBLIC SCHOOLS' CONFERENCE

Class : 11 com.	Duration: 3 hrs
Date : 20/02/25	Max. Marks: 80
Admission No.:	Roll No.:

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment of 4 marks each with sub-parts.

_____

Section –A

(Multiple Choice Questions)

Each question carries 1 mark

1. The base of binary number system is :
   a) 1 b) 2 c) 3 d) none of these

2. $(512)^{-2/3}$ is equal to:
   a) 1/16 b) 1/64 c) 1/32 d) none of these

3. If $\log_x 4 = 1/4$, then the value of x is:
   a) 4 b) 36 c) 256 d) none of these

4. How many rotations will the hour hand of a clock completes in 72 hours?
   a) 3 b) 6 c) 9 d) none of these

5. Which of the following is not true:
   a) $A \cap B = B \cap A$ b) $A \cap A = A$ c) $A \cap \phi = \phi$ d) none of these

6. The number of two digit even numbers that can be formed from the digits 1,2,3,4,5 if the digits can be repeated is:
   a) 25 b) 10 c) 20 d) none of these

7. The number of triangles that can be formed by choosing the vertices from a set of 12 points, seven of which lies on the same straight line.
   a) 105 b) 15 c) 175 d) none of these

8. Let A be a finite set containing 3 elements then the number of functions from A to A is:
   a) 512 b) 511 c) 27 d) 26

9. $\lim_{x \to 0} \frac{\sqrt{1+x}-1}{x}$ is equal to:
   a) 4 b) 1 c) ¼ d) ½

10. $\lim_{x \to 0} \frac{|x|}{x}$ is equal to:
    a) 1 b) -1 c) 0 d) does not exist

11. The third term of G.P is 4. The product of its first 5 terms is :
    a) 4^3 b) 4^4 c) 4^5 d) none of these

12. If 9 times the 9th term of an A.P is equal to 13 times the 13th term. Then the 22nd term of the A.P is:

a) 0   b) 22   c) 220   d) 219

13. If f(x) =x(x+1), then f'(1) is equal to:
   a) 0   b) 1   c) 3   d) -1

14. If a die is rolled, then the probability that a number 1 or 6 may appear is:
   a) 2/3   b) 5/6   c) 1/3   d) none of these

15. If P(A) = ½, P(B) = 0,then P(A/B) is:
   a) 0   b) 1   c) 1/2   d) not defined

16. The measure of central tendency of a statistical data which takes into account all the data is:
   a) Mean   b) Median   c) Mode   d) Range

17. The compound interest on Rs. 50000 at 5% per annum is Rs. 5125. The time period is:
   a) $1\frac{1}{2}$ yrs   b) 2 yrs   c) $2\frac{1}{2}$ yrs   d) 3 yrs

18. Deduction of PPF (public provident fund) is allowed under section:
   a) 80C   b) 80D   c) 80E   d) 80TTA

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R).
Choose the correct answer out of the following choices.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

19. ASSERTION (A): The domain of the function f(x) = $\frac{x-3}{2x+1}$ is R- $\left\{-\frac{1}{2}\right\}$.

   REASON (R): The range of the function f(x) = $\frac{x-3}{2x+1}$ is R - $\left\{\frac{1}{2}\right\}$.

20. ASSERTION (A): Rs. 25000 will be amount to Rs. 27300 in 2 yrs , at compound interest if the rates for the successive years are 4% and 5% per year.

   REASON (R): Amount= p $(1+\frac{r_1}{100})$ $(1+\frac{r_2}{100})$

SECTION B

Each question carries 2 mark

21. Given log 4 = 0.6020600 and log 3 = 0.4771213, find log $(0.00018)^{1/7}$. (5/2.31)

22. By using the concept of slope, show that the points (-2.-1), (4, 0) (3, 3) and (-3, 2) are the vertices of a parallelogram.

23. Evalaute $\lim\limits_{x\to0}\frac{a^x-b^x}{x}$.

24. Find the value of n if P(n,4): P(n-1,3) = 9:1

OR

Find the value of $\frac{9!}{6!x3!}$.

25. Differentiate the function: 5^x+logx.

OR

Find $\frac{dy}{dx}$ when x²+xy+y² =100.

SECTION C

Each question carries 3 mark

26. Tap A and B can fill a tank in 4 hrs and 6 hrs respectively and tap C (at the bottom) can empty it in 12hrs. If all the three taps are opened together when the tank is empty, find after how many hours the tank will be full.

OR

A and B together can dig a pond in 20days. They worked together for 8 days and then B leaves the work. How long will A take to finish the work if A alone can dig the pond in 30 days?

27. If n(A-B) = 10, n(B-A) =8 and n(A∩B)=3, find i) n(A∪B) , ii) n(A).

OR

If A and B are two sets such that n (A-B) =14+x, n (B-A) =3x and n (A∩B) =x. If n (A) =n (B), find the value of x.

28. If the third, sixth and the last terms of a G.P are 6, 48 and 3072 respectively, find the first term and the number of terms in the G.P.

29. Five boys and 5 girls are to be seated on a bench with the boys and girls alternately. Find the number of ways of their seating.

OR

How many words can be made from the letter in word "MONDAY", assuming that no letters repeated, i) if 4 letters are used at a time, ii) all letters are used at a time.

30. Find the equation of the circles which touch both the axes and ass through the point (2, 1).

31. Two cards are drawn at random one by one without replacement from a pack of 52 playing cards. Find the probability that both the cards are black.

SECTION D
Each question carries 5 mark

32. Find the probability that when a hand of 7cards is drawn from a well shuffled deck of 52 cards. It contains
    i)   All king, ii) Exactly 3 kings.

OR

If A and B are two events such that P (A) =0.54, P (B) = 0.69 and P (A∩B) =0.35. Find i) P (A∪B), ii) P (A'∩B').

33. Find the mode of the following data:

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	7	14	13	12	20	11	15	8

OR

Calculate the variance of given data:

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

34. A sum of Rs. 25000 invested @8% p.a. compounded semi-annually amounts to Rs. 28121.60. Compute the time period of investment.

35. The printed price of an air conditioner (AC) is Rs. 45000. The wholesaler allows a discount of 10% to a dealer. The dealer sells the air conditioner to a consumer at a discount 4% on the marked price. If the sells is intra-state and rate of GST is 18%. Find i) The amount of tax (under GST) paid by the dealer to central and state government, ii) the amount of tax (under GST) received by central and state government.

SECTION E

Each question carries 4 mark

[This section comprises of 3 case- study/passage based questions of 4 marks each with sub parts. The first two case study questions have three sub parts (i), (ii), (iii) of marks 1, 1, 2 respectively. The third case study question has two sub parts of 2 marks each.)

36. Read the following information carefully and answer the questions given below:
    Nine girls A, B, C, D, E, F, G, H and I are sitting in a row. D is sitting second to the right of E and C is sitting third to the right of E. B is sitting at one end of the row. H is sitting between F and G. B is sitting third to the right of F. F is sitting to the immediate right of A.

1) Write the sitting arrangement.
2) Who are the immediate neighbours of A?
3) Who is sitting to the right of E?

37. The number of bacteria in a culture doubles every hour. There were 15 cells of bacteria present initially. Scientists attempt to understand the growth rates of this bacteria when kept in different conditions.
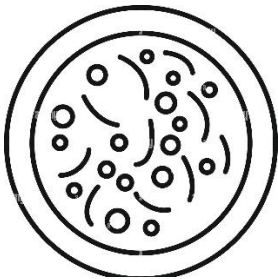
1) If the culture is kept under the original conditions. What will be the number of cells after 5 hours?
2) If the culture is kept under the original conditions, what will be the number of cells after 17 hours?
3) If the culture is placed in humid surroundings, the number of bacteria triples. What will be the number of cells after 5 hours?

38. Eight athletes participate in race.

1) In how many ways can three prizes be won?
2) In how many ways can five prizes be won?

*** BEST OF LUCK***