



BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY | CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL



MID-TERM EXAMINATION 2023-24

APPLIED MATHEMATICS (241)

Class : XI COM

Duration: **3 Hrs**

Date : 13/10/23

Admission No:

MARKING SCHEME

Max. Marks: **80**

Roll No. :

1. B) 1000
2. A) 21
3. B) 2
4. A) 1/9
5. B) -6
6. D) 0
7. D) is increased by 5
8. D) 12 Days
9. D) 120M
10. C) $\{x: x \in N, x \text{ is a factor of } 128\}$
11. D) $B-A = \emptyset$
12. D) 64
13. B) P
14. A) $q^2 = pr$
15. B) 22
16. A) 450
17. C) 24
18. B) $2^{10}-1$
19. A
20. C
21. $\frac{5^n(5^2-6.5)}{5^n(13-2.5)} = \frac{25-30}{13-10} = \frac{-5}{3}$
22. A's 1 hr work = $1/60$, B's 1 hr work = $1/90$,
1 hr work of A and B together
= $1/60 + 1/90 = 1/36$, 36 hrs.

OR

A's 1 day work = $1/2$, B's 1 day work = $1/3$, C's 1 day work = $1/4$, They should divide the money in the ratio $1/2 : 1/3 : 1/4$, $1/2 \times 12 : 1/3 \times 12 : 1/4 \times 12$, 6:4:3 ,

A's share $\frac{6}{13} \times 3900 = 1800$, B's share = $\frac{4}{13} \times 3900 = 1200$, C's share = $\frac{3}{13} \times 3900 = 900$.

23. $A' \cap B' = (A \cup B)' = n(U) - n(A \cup B) = 700 - 420 = 280$.
24. $a = 5/2, r = 1/2$, $a_{20} = ar^{n-1}$, $a_{20} = 5/2 (1/2)^{19} = 5 \cdot (1/2)^{20}$

OR

$a = 6, d = 5$, $S_n = n/2 \{2a + (n-1)d\} = n/2 \{12 + (n-1)5\} = n/2(7+5n)$.

25. $\frac{9!}{6!3!} = 84$.

26. $110101 - 11010 = 11011$ OR 1100001101

$$27. \log_{10} \frac{x}{2x-1} = 1, \frac{x}{2x-1} = 10, x = 20x - 10, -19x = -10, x = 10/19.$$

$$28. \text{Average Speed} = \frac{2x \cdot 10x \cdot 6}{10+6} = \frac{120}{16} = 7.5 \text{ km/hr.}$$

OR

$$\text{Average speed} = \frac{280}{7} = 40 \text{ km/hr}$$

$$29. \text{ i) } n(A) = n(B) \quad \text{ii) } 14+2x + 4x - x$$

$$14+x+x = 3x+x \quad 14+5x$$

$$14+2x = 4x \quad 14+35$$

$$14=2x \quad 49$$

$$X=7$$

$$30. 5+55+555+\dots$$

$$= 5(1+11+111+\dots)$$

$$= 5/9 (9+99+999+\dots)$$

$$= 5/9 (10-1 + 10n - 100-1 + 1000-1+\dots)$$

$$= 5n/9 \left(10 \left\{ \frac{10^n - 1}{10 - 1} \right\} - n \right)$$

$$= 5/81 (10^{n+1} - 10 - 9n)$$

OR

$$a_7 = 64, ar^{7-1} = 64, 729 r^6 = 64, r^6 = 64/729, r = 2/3, -2/3$$

$$S_7 = \frac{a(1-r^7)}{1-r} = 2187 - 128 = 2059 \text{ or } 2315/5 = 463$$

$$31. {}^5P_4 = 270725, \text{ i) } {}^4C_1 \times {}^{13}C_4 = 2860, \text{ ii) } {}^2C_1 \times {}^{26}C_4 = 29900$$

$$32. \log x = \log \frac{(42.87)^{1/2} \times 84.9}{0.234} = \frac{1}{2} \log(42.87) + \log(84.9) - \log(0.234)$$

$$= 0.81605 + 1.9289 - (-1+0.3692) = 0.8161 + 1.9289 + 1 - 0.3692$$

$$\log x = 3.3758, x = \text{antilog } 3.3758, x = 2357$$

$$33. A's 1 \text{ day work} = B's 2 \text{ days work}$$

$$B's 1 \text{ day work} = A's \frac{1}{2} \text{ day work}$$

Since A and B together can build a wall in 30 days

$$A's \text{ one day work} + B's \text{ one day work} = 1/30$$

$$A's 1 \text{ day work} + A's \frac{1}{2} \text{ day work} = 1/30$$

$$A's \frac{3}{2} \text{ days' work} = 1/30 \quad A's 1 \text{ day work} = 2/3 \times 1/30 = 1/45$$

Therefore 45 days

OR

$$1 \text{ man's work} = 3/2 \text{ boys work}$$

$$4 \text{ man's work} = 3/2 \times 4 \text{ boys work}$$

$$4 \text{ men and 9 boys work} = 9+6 = 15 \text{ boys work}$$

Since 3 boys can do the work in 40 hrs

$$1 \text{ boy can do the work in } 3 \times 40 \text{ hrs} = 120 \text{ hrs}$$

$$15 \text{ boys can do the work in } 120/15 = 8 \text{ hrs.}$$

$$34. \left\{ \frac{m/2\{(2a+(m-1)d)\}}{n/2\{(2a+(n-1)d)\}} \right\} = \frac{m^2}{n^2}$$

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

$$2a(m-n) = [n(m-1) - m(n-1)]d$$

$$2a(m-n) = (m-n)d, 2a=d$$

$$\frac{a_m}{a_n} = \frac{a+(m-1)d}{a+(n-1)d} = \frac{a+(m-1)2a}{a+(n-1)2a} = \frac{2m-1}{2n-1}$$

OR

Let $a^{1/x} = b^{1/y} = c^{1/z} = k$, since abc are in G.P.

$(k^y)^2 = k^x k^z$, $k^{2y} = k^{x+z}$, $2y = x+z$, hence xyz are in A.P

35. ${}^9C_r - {}^8C_3 = {}^8C_2$, ${}^9C_r = {}^8C_2 + {}^8C_3$, ${}^9C_r = {}^9C_3$, $r=3$ or $9=r+3$, $r=3$ or $r=6$

36. i) B) 20

ii) A) 13

iii) C) 11

37. i) A) 24

ii) C) 24

iii) B) 120

38. i) EKAJBIGCHDF

ii) I

ii) C and D
