



Attempt questions first; check the separate key afterward. Show all working. Draw accurate figures where required.

A. Very short answers - 1 mark each

1. Write the place value of 7 in 57204.
2. Write 90806 in expanded form.
3. Write 49 in Roman numerals.
4. Convert XCIV to Hindu-Arabic notation.
5. Explain the role of zero as a placeholder.
6. How do 205 and 25 differ in place value?
7. Convert binary 1011 to decimal.
8. Convert decimal 13 to binary.

B. Short answers / practice - 2 marks each

9. Convert base-five 123 to decimal.
10. Convert decimal 24 to base five.
11. Which digits are allowed in base six?
12. Is 128 a valid base-eight numeral?
13. Write 6042 as a sum of digits times powers of ten.
14. What is the decimal value of base-eight 100?
15. Write 5070608 using Indian commas.
16. Write it using international commas.
17. Explain positional and non-positional number systems.
18. Why is carrying linked to the base of a system?
19. Add binary 101 and 11.
20. Add base-five 23 and 14.

C. Application / reasoning - 3 marks each

21. Find the decimal value of binary 10000.

22. What happens when a zero is appended to a nonzero binary integer?

23. Form the largest number using 0, 2, 5, 8 once each.

24. Form the smallest four-digit number using them once each.

25. Write 2026 in Roman numerals.

26. Explain why ordinary Roman numerals are awkward for long multiplication.

27. Convert binary 11101 into decimal.

28. Convert decimal 42 into base five.

29. Write 399 in Roman numerals.

30. Find decimal value of base-six 205.

31. A base-b numeral 31 equals decimal 22. Find b and check that its digits are valid.

D. Extended practice - 5 marks per pair

32. A base-b numeral 12 equals decimal 9. Find b.
33. A base-b numeral 23 equals decimal 15. Find b.
34. Compare tally marks with decimal notation for representing 1000.
35. Design a four-symbol base-four system and represent decimal 15.

ANSWER KEY - Numerical / closed questions

1) 7000. 2) $90000 + 800 + 6$. 3) XLIX. 4) 94. 7) 11. 8) 1101. 9) 38. 10) 44. 11) 0, 1, 2, 3, 4, 5. 12) No. 13) $6 \times 10^3 + 0 \times 10^2 + 4 \times 10 + 2$. 14) 64. 15) 50, 70, 608. 16) 5, 070, 608. 19) 1000. 20) 42. 21) 16. 22) Value doubles. 23) 8520. 24) 2058. 25) MMXXVI. 27) 29. 28) 132. 29) CCCXCIX. 30) 77. 31) $b=7$; valid. 32) 7. 33) 6. 35) Base-four 33, with consistent chosen symbols.