M.C.A Code No (492)

Set No. 1

Question Booklet No. 07925

16P/203/10(i)

(To be filled up by the candidate by blue/black ball-point pen)

Roll No.

Serial No. of OMR Answer Sheet .... (2016) ......

Day and Date ....

(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

*(Use only **blue/black ball-point pen** in the space above and on both sides of the Answer Sheet)*

1. Within 30 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.

2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope.*

3. *A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*

4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space provided above.

5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*

6. *No overwriting is allowed in the entries of Roll No., Question Booklet no. and Set no. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Question Booklet.*

7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfairmeans.*

8. *Each question in this Booklet is followed by four alternative answers. For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet.*

9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.

10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*

11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.

12. Deposit only **OMR Answer Sheet** at the end of the Test.

13. You are not permitted to leave the Examination Hall until the end of the Test.

14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

Total No. of Printed Pages : 48

[उपयुक्त निर्देश हिन्दी में अन्तिम आवरण पृष्ठ पर दिये गए हैं।

3

ROUGH WORK
रफ़ कार्य

16P/203/10(i)

No. of Questions : 150

प्रश्नों की संख्या : 150

Time : $2\frac{1}{2}$ Hours   **Full Marks : 450**

समय : $2\frac{1}{2}$ घण्टे   **पूर्णांक : 450**

Note : (1) Attempt as many questions as you can. Each question carries 3 (Three) marks. ***One mark will be deducted for each incorrect answer.*** **Zero** mark will be awarded for each unattempted question.

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक प्रश्न 3 (तीन) अंकों का है। *प्रत्येक गलत उत्तर के लिए एक अंक काटा जायेगा।* प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक *शून्य* होगा।

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

01. Which of the following is **true** ?

    (1) $\log (a \times b) = \log a \times \log b$

    (2) $\text{Log} (a \times b) = \log a + \log b$

    (3) $\log \dfrac{a}{b} = \log a + \log b$

    (4) $\log a^b = \log a \times \log b$

3

P.T.O.

02. If $10^x = x^{50}$, then x is equal to :

(1) 100   (2) 200   (3) $\sqrt{10}$ (4) $\sqrt{5}$

03. The value of $7 \log \dfrac{16}{15} + 5 \log \dfrac{25}{24} + 3 \log \dfrac{81}{80}$ is equal to :

(1) log 2   (2) zero   (3) unity   (4) 0.2

04. The logarithms of $27 \times 4\sqrt{9} \times 3\sqrt{9}$ to the base 3 is :

(1) $8\dfrac{2}{3}$ (2) $4\dfrac{1}{6}$ (3) 4   (4) 3

05. If log z = 0.3010 and log 3 = 0.4771, then the value of log 5 is :

(1) 0.7781   (2) 0.6990

(3) 0.3010   (4) 1.6990

06. If $a^x = b^y = c^z$ and $b^2 = ac$, then the value of $\dfrac{1}{x} + \dfrac{1}{z}$ is equal to :

(1) $\dfrac{1}{y}$ (2) $\dfrac{1}{z}$ (3) $\dfrac{2}{z}$ (4) $\dfrac{2}{y}$

07. If a, b, c are positive numbers, then the value of $\left(\dfrac{2^a}{2^b}\right)^{a+b} \cdot \left(\dfrac{2^b}{2^c}\right)^{b+c} \cdot \left(\dfrac{2^c}{2^a}\right)^{c+a}$ is :

(1) 2   (2) -2 (3) $\dfrac{1}{2}$ (4) 1

08. The value of $\left(\dfrac{x^l}{x^{-m}}\right)^{l-m}\left(\dfrac{x^m}{x^{-n}}\right)^{m-n}\left(\dfrac{x^n}{x^{-l}}\right)^{n-l}$ is equal to :

(1) 0   (2) -1 (3) 1   (4) 2

09. If $\log \dfrac{125}{25} = x$, the value of x is :

(1) 1   (2) $\dfrac{1}{2}$ (3) $\dfrac{3}{2}$ (4) 5

10. The value of $\log_2 8 + \log_4 8 + \log_{16} 8$ is equal to :

(1) $\dfrac{21}{4}$ (2) 5   (3) 6   (4) 4

11. If a and b be real numbers and if a − b is negative, then we say :

(1) $a < b$ (2) $a > b$

(3) $a = 0, b = 0$ (4) $a = b = 1$

5

P.T.O.

12. The value of $\frac{1}{a} < \frac{1}{b}$, if :

    (1) $a \neq 0, b \neq 0$ and $a < b$ (2) $a \neq 0, b \neq 0$ and $a > b$

    (3) $a \neq 0, b = 0$ and $a < b$ (4) $a = 0, b \neq 0$ and $a > b$

13. The value of $a^x < a^y$, if :

    (1) $0 < \frac{1}{a} < 1$ and $\frac{1}{x} > \frac{1}{y} > 0$ (2) $0 < \frac{1}{a} < 1$ and $\frac{1}{x} < \frac{1}{y} < 0$

    (3) $0 < a < 1$ and $x > y > 0$ (4) $0 > a > 1$ and $x < y < 0$

14. The arithmetic mean of two positive quantities is **greater** than or equal to :

    (1) Zero   (2) Arithmetic mean

    (3) Geometric mean   (4) Harmonic mean

15. For all $x > 0$, the value of $x + \frac{1}{x}$ is :

    (1) ≥ 2 (2) ≤ 2 (3) ≥ 0 (4) ≤ 0

16. If n is a positive integer, then the value of $\frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots + \frac{1}{2n}$ is :

    (1) > 0 (2) < 0 (3) $> -\frac{1}{2}$ (4) $> \frac{1}{2}$

17. If a, b, c > 0, then the value of $\dfrac{a}{b+c} + \dfrac{b}{c+a} + \dfrac{c}{a+b}$ is :

(1) $\geq \dfrac{1}{2}$ (2) $\geq \dfrac{3}{2}$ (3) $\geq \dfrac{5}{2}$ (4) $\geq \dfrac{7}{2}$

18. If a > 0, b > 0, c > 0, then the value of $(a + b + c)\left(\dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{c}\right)$ is greater or equal to :

(1) 9   (2) 6   (3) 3   (4) 0

19. If a, b, c are in H.P. and n > 1, then the value of $a^n + c^n$ is greater than :

(1) $\dfrac{2}{b^n}$ (2) $\dfrac{1}{2}b^n$ (3) $2b^n$ (4) $\dfrac{3}{2}b^n$

20. If a, b, c are real numbers such that $a^3 + b^3 + c^3 = 1$, then the value of a.b + b.c + c.a is greater than :

(1) 0   (2) 1   (3) $\dfrac{1}{2}$ (4) $-\dfrac{1}{2}$

21. If the column vectors of a square matrix A are linearly dependent, then :

(1) $|A| = 1$ (2) $|A| = \infty$

(3) $|A| \neq 0$ (4) $|A| = 0$

P.T.O.

22. If A is non-singular matrix and so is matrix B, and if A and B are square matrices of the same order, then :

   (1) AB is non-singular   (2) AB is singular

   (3) $(AB)^{-1} = A^{-1} B^{-1}$ (4) $(AB)^{-1}$ does not exist

23. A necessary and sufficient condition that a square matrix A possesses an inverse is that :

   (1) A is not a null matrix   (2) A is a null matrix

   (3) $|A| \neq 0$ (4) $|A| = 0$

24. If A is 3×3 matrix whose rank is 2 and B is 3×3 matrix whose rank is 3, then rank of AB is :

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

25. The matrix $\begin{bmatrix} 0 & 5 & -2 \\ -5 & 0 & -7i \\ 2 & 7i & 0 \end{bmatrix}$ is :

   (1) Skew - Hermitian   (2) Hermitian

   (3) Skew - Symmetric   (4) Symmetric

8

26. If $D_1 = \begin{vmatrix} 3 & 7 & 1 \\ -2 & 1 & 4 \\ 6 & -4 & 3 \end{vmatrix}$ and $D_2 = \begin{vmatrix} 3 & -2 & 6 \\ 7 & 1 & -4 \\ 1 & 4 & 3 \end{vmatrix}$, then :

    (1) $D_1 = 3\,D_2$ (2) $D_1 = -D_2$

    (3) $D_1 = D_2$ (4) $3\,D_1 = D_2$

27. The determinant $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix}$ is divided by :

    (1) $a + b$ (2) $a\,b\,c$

    (3) $1 - a\,b\,c$ (4) $1 + a\,b\,c$

28. The determinant $\begin{vmatrix} a^2+b^2 & ac+bd \\ ac+bd & c^2+d^2 \end{vmatrix}$ is equal to :

    (1) $\begin{vmatrix} a & b \\ c & d \end{vmatrix}^2$ (2) $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ (3) $\begin{vmatrix} a & d \\ b & c \end{vmatrix}^2$ (4) $\begin{vmatrix} a & d \\ b & c \end{vmatrix}$

29. The value of determinant $\begin{vmatrix} x+\lambda & x & x \\ x & x+\lambda & x \\ x & x & x+\lambda \end{vmatrix}$ is equal to :

    (1) 3λ (2) λ^3

    (3) 2λ (4) λ^2

P.T.O.

30. Let $A_1 = \begin{vmatrix} 3 & 7 & 4 \\ -2 & 1 & 5 \\ 6 & 18 & 3 \end{vmatrix}$ and $A_2 = \begin{vmatrix} 3 & 7 & 4 \\ -2 & 1 & 5 \\ 2 & 6 & 1 \end{vmatrix}$ then :

(1) $A_1 = A_2$

(2) $A_1 = -A_2$

(3) $A_1 = 2 A_2$

(4) $A_1 = 3 A_2$

31. If the nth term of a series is given by $\dfrac{3+n}{4}$, them the sum of 105 terms of this series is :

(1)   1470

(2)   1500

(3)   1570

(4)   1600

32. If m^{th} term of an A.P. is n and its nth term is m, then its pth and $(m + n)^{th}$ terms of the series will be :

(1) $m - n + p, \ 0$

(2) $m - n + p, \ 1$

(3) $m + n - p, \ 0$

(4) $m + n - p, \ 1$

33. If the sums of p, q and r terms of A.P. series be a, b and c respectively, then the value of $\dfrac{a}{p}(q-r) + \dfrac{b}{q}(r-p) + \dfrac{c}{r}(p-q)$ is equal to :

(1)   0

(2)   1

(3)   −1

(4)   2

34. If the sum of three numbers in A.P. is 15 whereas sum of their squares is 83, then the numbers are :

(1)   2, 3, 4

(2)   3, 5, 7

(3)   1, 4, 9

(4)   4, 5, 6

35. If the sum of first three terms of a G.P. is to the sum of the first six terms as 125 : 152, then the common ratio of the G.P. is :

(1) $-\dfrac{5}{7}$

(2) $\dfrac{5}{7}$

(3) $-\dfrac{3}{5}$

(4) $\dfrac{3}{5}$

36. If $x = 1 + a + a^2 + a^3 + \ldots\ldots\ldots \infty$ $(a < 1)$

and $y = 1 + b + b^2 + b^3 + \ldots\ldots\ldots \infty$ $(b < 1)$,

then the value of $1 + ab + a^2b^2 + a^3b^3 + \ldots\ldots\ldots \infty$ is equal to :

(1) $\dfrac{xy}{x-y-1}$

(2) $\dfrac{xy}{x-y+1}$

(3) $\dfrac{xy}{x+y-1}$

(4) $\dfrac{xy}{x+y+1}$

11

37. In a G.P., if the $(m+n)^{th}$ term be p and $(m-n)^{th}$ term be q, then its mth term is :

(1) $\sqrt{\left(\dfrac{p}{q}\right)}$ (2) $\sqrt{(pq)}$ (3) $\sqrt{(p+q)}$ (4) $\sqrt{(p-q)}$

38. If the harmonic mean of two numbers is 4 and their arithmetical mean A and geometric mean G satisfy the relation $2A + G^2 = 27$, then two numbers are :

(1) 6 and 3   (2) 7 and 4

(3) 5 and 2   (4) 9 and 5

39. If p^{th} term of H.P. is q r and q^{th} term is r p, then r^{th} term is :

(1) $\sqrt{pq}$ (2) p q   (3) p + q   (4) p − q

40. If a, b, c be in Arithmetical progression, b, c, a be in Harmonical progression, then c, a, b are in :

(1) Arithmetical progression   (2) Geometrical progression

(3) Arithmetical Geometric   (4) Harmonical progression

41. If $^nC_{r-1} = 36$, $^nC_r = 84$ and $^nC_{r+1} = 126$, then r is equal to :

    (1)   0   (2)   1   (3)   2   (4)   4

42. The coefficient x^4 in $\left(\dfrac{x}{2} - \dfrac{3}{x^2}\right)^{10}$ is :

    (1) $\dfrac{405}{256}$ (2) $\dfrac{504}{259}$ (3) $\dfrac{450}{263}$ (4) $\dfrac{540}{256}$

43. The coefficient of y in the expansion of $\left(y^2 + \dfrac{c}{y}\right)^5$ is :

    (1)   20 c   (2)   10 c   (3) $10\,c^3$ (4) $20\,c^3$

44. The coefficient of x^p and x^q (p and q are positive integers) in the expansion of $(1 + x)^{p+q}$ are :

    (1)   equal

    (2)   equal with opposite signs

    (3)   reciprocal to each other

    (4)   zero

45. Given positive integers i>0, n > 2 and that the coefficients of $(3r)^{th}$ and $(r + 2)^{th}$ terms in the binomial expansion of $(1 + x)^{2n}$ are equal, then :

    (1)   n = 2r   (2)   n = 3r

    (3) $n = 2r + 1$ (4)   n = 2r – r

P.T.O.

46. The term independent of x in the expansion of $\left(\sqrt{\dfrac{x}{3}}+\dfrac{3}{2x^2}\right)^{10}$ is :

(1) $-\dfrac{4}{5}$ (2) $\dfrac{5}{4}$ (3) $-\dfrac{5}{6}$ (4) $\dfrac{6}{5}$

47. If the coefficient of $(2r+1)^{th}$ term and $(r+2)^{th}$ term in the expansion of $(1+x)^{43}$ are equal, then the value of r is equal to :

(1) 3   (2) 6   (3) 10   (4) 14

48. If the coefficients of second, third and fourth terms in the expansion of $(1+x)^{2n}$ are in A.P., then :

(1) $n^2 - 7n + 9 = 0$ (2) $n^2 + 7n - 9 = 0$

(3) $2n^2 - 9n + 7 = 0$ (4) $2n^2 + 9n - 7 = 0$

49. The value of $C_1 + 2C_2 + 3C_3 + \ldots\ldots + nC_n$ is equal to :

(1) $n.2^{n+1}$ (2) $n.2^{n-1}$

(3) $3n.2^{n+1}$ (4) $3n.2^{n-1}$

50. The value of $\dfrac{1}{1!(n-1)!} + \dfrac{1}{3!(n-3)!} + \dfrac{1}{5!(n-5)!} + \text{.........}$ is equal to :

(1) $\dfrac{2^{n-1}}{n!}$

(2) $\dfrac{2^{n+1}}{n!}$

(3) $\dfrac{3^{n-1}}{(2n)!}$

(4) $\dfrac{3^{n+1}}{(3n)!}$

51. If $^{15}C_{3r} = {}^{15}C_{r-3}$, then the value of r is equal to :

(1) 0   (2) 3   (3) 6   (4) 9

52. If $^9P_5 + 5 \cdot {}^9P_4 = {}^{10}P_r$, then the value of r is equal to :

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

53. The number of different permutations of the letters of the word BANANA is equal to :

(1) 15   (2) 30   (3) 45   (4) 60

54. The total number of 9 digit numbers which have all different digits is :

(1) 3265920

(2) 6345721

(3) 7534723

(4) 9437849

15

P.T.O.

55. Eight chairs are numbered 1 to 8. Two women and three men wish to occupy one chair each. First the women choose the chairs from amongst the chairs marked 1 to 4; and then men select the chairs from amongst the remaining. The number of possible arrangements is :

(1) $^6C_3 \times {}^4C_2$ (2) $^4C_2 \times {}^4P_3$ (3) $^4P_2 \times {}^4P_3$ (4) $^4P_2 \times {}^6P_3$

56. The total number of permutations of n different things taken not more than r at a time, when each thing may be repeated any number of times is :

(1) $\dfrac{n^r(n-1)}{(n+1)}$ (2) $\dfrac{n^r(n+1)}{(n-1)}$ (3) $\dfrac{n(n^r-1)}{(n-1)}$ (4) $\dfrac{n^r-1}{n-1}$

57. Five balls of different colours are to be placed in three boxes of different sizes. Each box can hold all five balls. In how many different ways can we place the balls so that no box remains empty.

(1)   180   (2)   150   (3)   120   (4)   90

58. There are six students A, B, C, D, E, F. In how many ways can a committeee for four be formed so as to always include C but exclude D.

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

59. How many numbers can be formed by using all the digits 1, 2, 3, 4, 3, 2, 1 so that the odd digits always occupy the odd places.

(1) 6   (2) 12   (3) 18   (4) 23

60. From 6 gentleman and 4 ladies a committee of 5 is to be formed. In how many ways can this be done if the committee is to include at least one lady :

(1) 146   (2) 246   (3) 252   (4) 352

61. If α and β are the roots of $ax^2 + bx + c = 0$, then the equation whose roots are $\dfrac{1}{\alpha + \beta}, \dfrac{1}{\alpha} + \dfrac{1}{\beta}$ is :

(1) $b c x^2 + (b^2 + ac) x + ab = 0$ (2) $c a x^2 + (c^2 + ba) x + bc = 0$

(3) $a b x^2 + (a^2 + cb) x + ca = 0$ (4) $b c x^2 + (b^2 - ac) x - ab = 0$

P.T.O.

62. If $\alpha \neq \beta$, but $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3$ then the equation whose roots are

$\dfrac{\alpha}{\beta}$ and β/α is :

(1) $x^2 - 15x - 3 = 0$

(2) $3x^2 + 15x + 3 = 0$

(3) $x^2 + 19x + 3 = 0$

(4) $3x^2 - 19x + 3 = 0$

63. If the coefficient of x in the quadratic 'equation' $x^2 + px + q = 0$ was taken as 17 in place of 13, its roots were found to be -2 and -15, then the roots of the original equation are :

(1) 9, 4

(2) 10, 3

(3) $-10, -3$

(4) $-9, -4$

64. If α be a root of the equation $4x^2 + 2x - 1 = 0$, then the other root is :

(1) $3\alpha^4 - 4\alpha$

(2) $4\alpha^3 - 3\alpha$

(3) $4\alpha^3 + 3\alpha$

(4) $3\alpha^4 + 4\alpha$

65. If be α, β be the roots of $ax^2 + 2bx + c = 0$ and , $\alpha + \delta, \beta + \delta$ be those of $Ax^2 + 2Bx + C = 0$, then :

(1) $\dfrac{b^2 - ac}{B^2 - AC} = \left(\dfrac{a}{A}\right)^2$

(2) $\dfrac{b^2 + ac}{B^2 + AC} = \left(\dfrac{A}{a}\right)^2$

(3) $\dfrac{C^2 - BA}{c^2 - ba} = \left(\dfrac{B}{b}\right)^2$

(4) $\dfrac{C^2 + BA}{c^2 + ba} = \left(\dfrac{B}{b}\right)^2$

66. If the roots of $px^2 + qx + 2 = 0$ are reciprocals of each other, then :

(1) $p = 0$ (2) $p = -2$ (3) $q = 0$ (4) $p = 2$

67. If one root of the equation $ax^2 + bx + c = 0$ be square of the other, then :

(1) $c^3 + ba^2 + b^2a = 3abc$ (2) $b^3 + ac^2 + a^2c = 3abc$

(3) $a^3 + cb^2 + c^2b = 3abc$ (4) $b^3 - ac^2 + a^2c = -3abc$

68. If the sum of the roots of the equation $ax^2 + bx + c = 0$ is equal to sum of the squares of their reciprocals, then bc^2, ca^2, ab^2 are in :

(1) Arithmetical Progression

(2) Geometrical Progression

(3) Arithmetical Geometrical series

(4) Harmonical Progression

69. If the ratio of the roots of the equation $lx^2 + nx + n = 0$ be $p : q$, then :

(1) $(p+q+nl) = \sqrt{(pq)}$

(2) $\sqrt{\left(\dfrac{p}{n}\right)} + \sqrt{\left(\dfrac{q}{l}\right)} + \sqrt{(nl)} = 0$

(3) $\sqrt{\left(\dfrac{p}{q}\right)} + \sqrt{\left(\dfrac{q}{p}\right)} + \sqrt{\left(\dfrac{n}{l}\right)} = 0$

(4) $\sqrt{(p)} + \sqrt{(q)} + \sqrt{(nl)} = 0$

70. If p, q, r are real and $p \neq q$, then the roots of the equation

$(P - q) x^2 - 5 (p + q) x - 2 (p - q) = 0$ are :

(1) Real and equal

(2) Complex and equal

(3) Real and unequal

(4) Complex and unequal

71. If the relations is a function, then determine its domain and range :

(1) Domain = {1, 2, 3}, Range = {2}

(2) *Domain = {1, 2, 3}, Range = {3}*

(3) Domain = {1, 2}, Range = {3}

(4) Domain = {2, 3}, Range = {1}

72. If A and B are two non-empty sets such that A × B = B × A, then :

(1) A = 0   (2) B = 0   (3) A ≠ B   (4) A = B

73. If R be the relation on the set N of natural numbers defined by a + 3b = 12, then R is equal to :

(1) {(1, 9), (2, 6), (3, 1)}

(2) {(9, 1), (6, 2), (3, 3)}

(3) {(1, 9), (6, 3)}

(4) {(6, 2), (3, 1)}

74. If A = { x, y, z} and B = {1,2}, then the number of relations from A into B is :

(1) 16   (2) 27   (3) 64   (4) 81

75. If a function f : A → B which is both one-to-one and onto, then it is called as a :

(1) Linear function

(2) Surjective function

(3) Injective function

(4) Bijective function

76. Put the following $\left(\dfrac{1}{1-2i}+\dfrac{3}{1+i}\right)\left(\dfrac{3+4i}{2-4i}\right)$ in the form A + i B :

(1) $\dfrac{1}{4}+\dfrac{9}{4}i$

(2) $\dfrac{1}{4}-\dfrac{9}{4}i$

(3) $\dfrac{1}{5}+\dfrac{7}{5}i$

(4) $\dfrac{1}{5}-\dfrac{7}{5}i$

21

77. The square root of the complex number – 8 – 6i is :

(1) $\pm$ (3 + 4i)

(2) $\pm$ (3 – 4i)

(3) $\pm$ (4 + 3i)

(4) $\pm$ (4 – 3i)

78. Put the number $\dfrac{1+7i}{(2-i)^2}$ in trigonometrical form, that is, in the form

r (cos θ + i sin θ), where r is a positive real number and - π < θ ≤ π.

(1) $\sqrt{2}\left(\cos\dfrac{3\pi}{4} - i\sin\dfrac{3\pi}{4}\right)$

(2) $\sqrt{3}\left(\cos\dfrac{\pi}{4} - i\sin\dfrac{\pi}{4}\right)$

(3) $\sqrt{2}\left(\cos\dfrac{3\pi}{4} + i\sin\dfrac{3\pi}{4}\right)$

(4) $\sqrt{3}\left(\cos\dfrac{\pi}{4} + i\sin\dfrac{\pi}{4}\right)$

79. The real values of x and y for which the equations

$\dfrac{(1+i)x-2i}{3+i}$ + $\dfrac{(2-3i)y+i}{3-i}$ = i are satisfied, are :

(1)   x = 3, y = –1

(2)   x = –1, y = 3

(3)   x = 5, y = –2

(4)   x = –2, y = 5

80. If 1, ω, ω² are the three cube roots of unity, then the value of

$(1-\omega+\omega^2)^5 + (1+\omega-\omega^2)^5$ is equal to :

(1)   4

(2)   8

(3)   16

(4)   32

81. If $x = a + b$, $y = a\alpha + b\beta$ and $z = a\beta + b\alpha$, where α and β are complex cube roots of unity, then the value of $a^3 + b^3$ is equal to :

    (1) $x\,y\,z$ (2) $\dfrac{xy}{z}$ (3) $\dfrac{yz}{x}$ (4) $\dfrac{zx}{y}$

82. If the complex numbers z_1, z_2 and z_3 be the vertices of an equilateral triangle and z_0 be the circumference of the triangle, then the value of $z_1^2 + z_2^2 + z_3^2$ is equal to :

    (1) z_0^2 (2) $2z_0^2$ (3) $3z_0^2$ (4) $4z_0^2$

83. The equation of the straight line passing through the point of intersection of $3x + y + 4 = 0$, $3x - 5y + 34 = 0$ and perpendicular to the line $2x + 3y - 11 = 0$ is :

    (1) $9x + 7y - 17 = 0$ (2) $4x + 5y + 8 = 0$

    (3) $3x - 4y + 1 = 0$ (4) $3x - 2y + 19 = 0$

84. The point of intersection of the straight line given by equation $3y^2 - 8xy - 3x^2 - 29x + 3y - 18 = 0$ is :

    (1) $(-1, 1)$ (2) $(1, -1)$

    (3) $(2, 1)$ (4) $\left(-\dfrac{3}{2}, -\dfrac{5}{2}\right)$

85. The equation of the circle passing through (−1,2) and concentric with

$x^2 + y^2 - 2x - 4y - 4 = 0$ is :

(1) $x^2 + y^2 - 2x - 4y + 1 = 0$

(2) $x^2 + y^2 - 2x - 4y + 2 = 0$

(3) $x^2 + y^2 - 2x - 4y + 4 = 0$

(4) $x^2 + y^2 - 2x - 4y + 8 = 0$

86. The radius of the circle on which the four points of intersection of the

lines $(2x - y + 1)(x - 2y + 3) = 0$ with the axis lie, is :

(1)   5

(2) $\dfrac{5}{\sqrt{2}}$

(3) $\dfrac{5}{2\sqrt{2}}$

(4) $\dfrac{5}{4\sqrt{2}}$

87. The focal distance of any point $P(x_1, y_1)$ on the parabola $y^2 = 4ax$ is

equal to :

(1) $x_1 + y_1$

(2) $x_1\, y_1$

(3) $a\, x_1$

(4) $a + x_1$

88. If PQ be a double ordinate of a parabola, the locus of its points of

trisection is :

(1) $y^2 = \dfrac{1}{3}ax$

(2) $y^2 = \dfrac{2}{3}ax$

(3) $y^2 = \dfrac{1}{9}ax$

(4) $y^2 = \dfrac{4}{9}ax$

24

89. The locus of the middle points of chords of the ellipse $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$, which are drawn through the positive end of the minor axis is :

(1) $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=\dfrac{x}{a}$

(2) $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=\dfrac{y}{b}$

(3) $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=\dfrac{x}{b}$

(4) $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=\dfrac{y}{a}$

90. The line $y = mx + c$ touches the ellipse $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$, if c is equal to :

(1) $\pm\sqrt{\left(a^2-m^2b^2\right)}$

(2) $\pm\sqrt{\left(a^2+m^2b^2\right)}$

(3) $\pm\sqrt{\left(a^2m^2-b^2\right)}$

(4) $\pm\sqrt{\left(a^2m^2+b^2\right)}$

91. If $f(x) = \sqrt{\left(\dfrac{x-\sin x}{x+\cos^2 x}\right)}$, then $\lim\limits_{x\to\infty} f(x)$ is :

(1) 0   (2) ∞ (3) 1   (4) -1

92. For a real number y, let [y] denote the greatest integer less than or equal to y. Then

$$f(x) = \dfrac{\tan \pi [x-\pi]}{1+[x]^2}$$ is :

(1) discontinuous at some x,

(2) continuous at all x, but the derivative $f'(x)$ does not exists for some x,

(3) $f'(x)$ exists for all x but second derivative $f''(x)$ does not exist.

(4) $f'(x)$ exists for all x.

P.T.O.

93. A cone is circumscirbed to a sphere of radius r. When the volume of

the cone is minimum, its altitude is :

(1) 2r   (2) $\frac{1}{3}$ r²   (3) 4r   (4) $\frac{1}{2}$ r

94. The value of $\int e^x \left(\frac{1+x \log x}{x} \right) dx$ is equal to :

(1) xe^x (2) $e^x \log x$

(3) $\frac{e^x}{x}$ (4) $e^x + \log x$

95. The value of $\int_0^{\pi/4} \sin^4 x \cos^2 x \, dx$ is equal to :

(1) $\frac{\pi}{12}$ (2) $\frac{\pi}{16}$ (3) $\frac{\pi}{24}$ (4) $\frac{\pi}{32}$

96. The area under the curve y = sin x between x = 0 and x = π is:

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

97. The probability that at least one of the events A and B occurs is 0.6. If

A and B occur simultaneously with probability 0.2, then $P(\bar{A})+P(\bar{B})$ is :

(1) 0.4   (2) 0.8   (3) 1.2   (4) 1.4

(Here $\bar{A}$ and $\bar{B}$ are complements of A and B respectively)

98. The probability that a card drawn out of a packet of 52 is of diamond is :

(1) $\frac{1}{4}$ (2) $\frac{1}{13}$ (3) $\frac{1}{52}$ (4) 1

99. A die is tossed twice. The probability of 'a number greater than 4 on each toss' is :

(1) $\frac{1}{3}$ (2) $\frac{2}{3}$ (3) $\frac{1}{9}$ (4) $\frac{1}{12}$

100. A bag contains 5 red and 4 green balls. If three bags are selected at random from the bag, the probability that they are of same colour is :

(1) $\frac{1}{2}$ (2) $\frac{1}{6}$ (3) $\frac{2}{9}$ (4) $\frac{1}{3}$

Directions : Question No. 101 to **106.** These questions are based on the following diagram in which the triangle represents female graduates. Small circle rpresents self - employed females and the big circle represents self employed females with bank loan facility. Numbers are shown in the different sections of the diagram. On basis of these numbers, answer the following questions :

P.T.O.
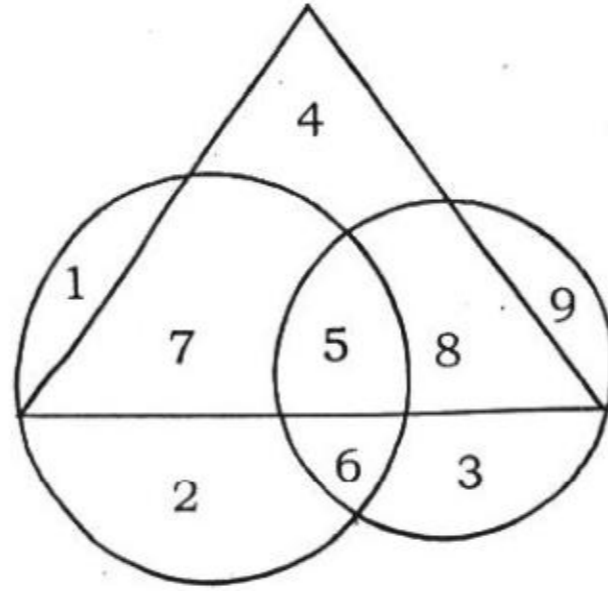
101. How many self-employed female graduates are with bank loan facility ?

    (1) 5   (2) 12   (3) 20   (4) 7

102. How many non-graduate self-employed females are with bank loan facility ?

    (1) 3   (2) 8   (3) 9   (4) 12

103. How many female graduates are not self-employed ?

    (1) 4   (2) 10   (3) 12   (4) 15

104. How many female graduates are self-employed ?

    (1) 12   (2) 13   (3) 20   (4) 15

105. How many non-graduate females are self-employed ?

    (1) 11   (2) 12   (3) 9   (4) 21

106. In a survey, 30% of the people surveyed owned a cellular telephone and 75% owned a personal computer. If 25% owned both a cellular telephone and a personal computer, the percentage of people who owned a cellular telephone or a personal computer or both is :

    (1) 60%   (2) 80%   (3) 70%   (4) 75%

Directions Questions No. 107 to 111. Data on the candidates, who took an examination in Social Sciences, Mathematics and Science are given below :

Passed in all subjects	167
Failed in all subjects	60
Failed in Social Sciences	175
Failed in Mathematics	199
Failed in Science	191
Passed in Social Science only	62
Passed in Mathematics only	48
Passed in Science only	52

Answer the following questions based on above data :

29

107. How many failed in one subject only ?

    (1) 56   (2) 61   (3) 144   (4) 152

108. How many failed in two subject only ?

    (1) 56   (2) 61   (3) 144   (4) 162

109. How many failed in Social Sciences only ?

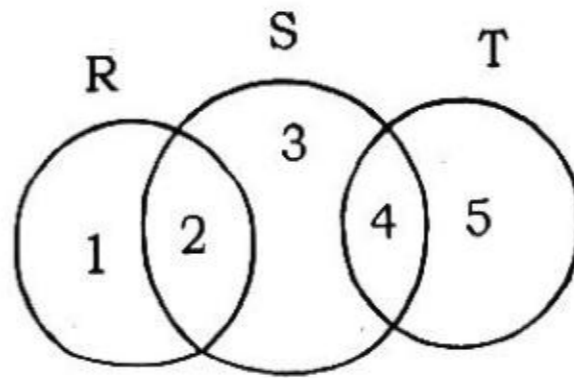   (1) 15   (2) 21   (3) 30   (4) 42

110. How many passed at least in one subject ?

    (1) 167   (2) 304   (3) 390   (4) 450

111. How many passed in Mathematics and at least in one more subject ?

    (1) 94   (2) 170   (3) 203   (4) 210

112. In the following diagram, R represents businessmen, S represents rich men, T represents honest men. Which number will represent honest rich men ?

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

Directions : Question No. 113 to 116. In the following figure, there are given some rectangles which represent. The particular qualities. Read the questions and find out the appropriate answer from the figure.
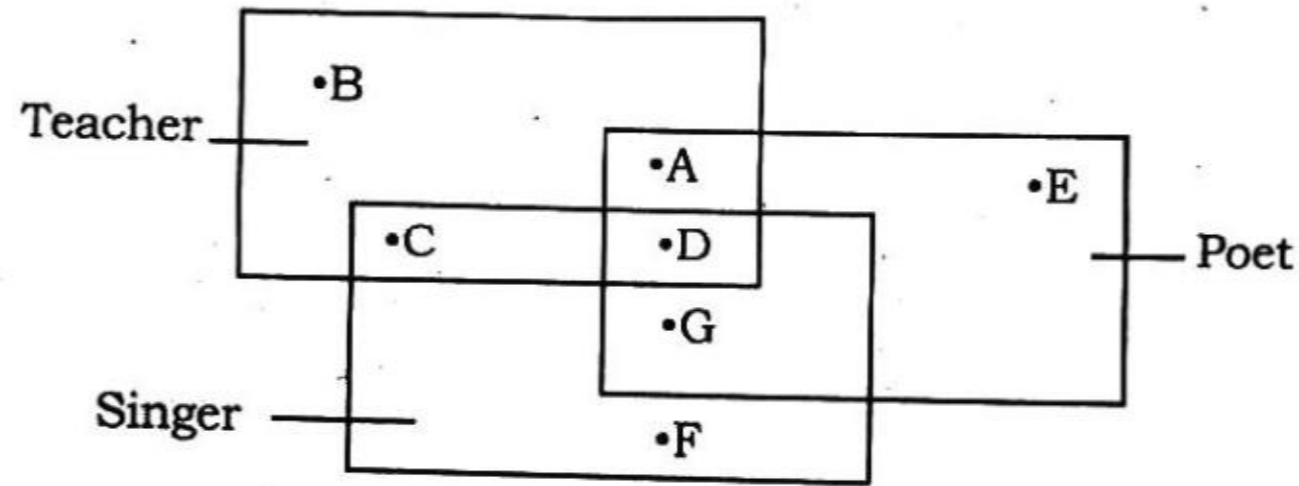
113. The teacher who is neither a singer nor a poet is :

(1) A   (2) B   (3) D   (4) G

114. The teacher who is a singer but not a poet is :

(1) A   (2) B   (3) C   (4) D

115. The teacher, who is singer and poet both is :

(1) A   (2) B   (3) C   (4) D

116. The poet, who is neither a singer nor a teacher is :

(1) D   (2) E   (3) G   (4) A

P.T.O.

Directions : Questions No. 117 to **119.** These questions are based on the diagram given below. In the diagram, the triangle stands for graduates, square for membership of professional organisations and the circle for *membership* of social organisations. Read **each** statement and find out appropriate numbers to represent the **people** covered by statement.
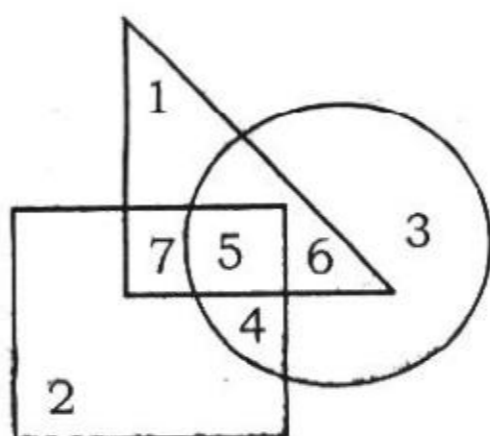
117. Number of graduates in social organisations is *represented by :*

(1)   1

(2)   5

(3)   6

(4)   5 and 6

118. Number of graduates in social organisations only, is represented by :

(1)   3

(2)   4

(3)   5

(4)   6

119. Number of graduates in professional organisation is represented by :

(1)   5 and 7

(2)   4, 5 and 6

(3)   6 and 7

(4)   5, 6 and 7

120. A survey was conducted on a sample of 1000 persons with reference to their knowledge of English, French and German. The result is presented in the Venn diagram. The ratio of the number of persons who do not know the three languages to those who know all the three languages is :

German / French

170 | 105 | 180
175
85 | 78
200
English
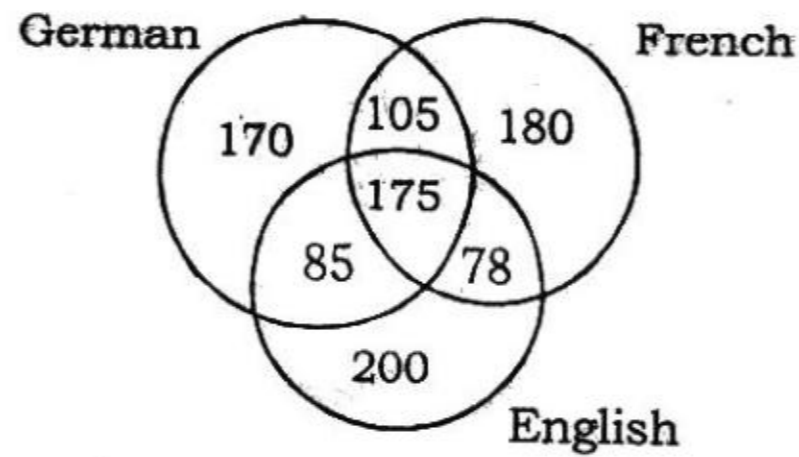
(1) $\dfrac{1}{27}$ (2) $\dfrac{1}{25}$ (3) $\dfrac{7}{550}$ (4) $\dfrac{175}{1000}$

Directions : Questions No. 121 to 125. The following questions are to be answered on the basis of the table given below. which gives the growth of regular monthly investments at 7% return.

Number of years	Monthly Investment			
	Rs. 50	Rs. 100	Rs. 250	Rs.500
2	1,292	2,583	6,458	12,915
5	3,601	7,201	18,003	36,005
10	8,705	17,109	43,524	87,047
20	26,198	52,397	1,30,991	2,61,983

121. How much total interest is earned on a 7% investment for a 5-year period with monthly investment of Rs. 100 ?

    (1) Rs. 8,201
    (2) Rs. 1,201
    (3) Rs. 6,000
    (4) Rs. 7,201

122. How much more is earned on a Rs. 500 monthly investment for 10 years, than a Rs. 250 monthly investment for 20 years ?

    (1) Rs. 43,944
    (2) Rs. 7,201
    (3) Rs. 18,003
    (4) Rs. 36,005

123. How much more is earned on a Rs. 50 monthly investment for 10 years, then on a Rs. 100 monthly investment for 5 years ?

    (1) Rs. 701
    (2) Rs. 150
    (3) Rs. 870
    (4) Rs. 1,504

124. What is the approximate ratio of the interest earned on a 10-year period to the interest earned over a 5 - year period with monthly investment of Rs. 100 ?

    (1) 8 : 1
    (2) 4 : 1
    (3) 2 : 1
    (4) 9 : 2

125. How much total interest is earned on a 7% investment for a 10-year period with monthly investment of Rs. 100 ?

    (1)   Rs. 5,400   (2)   Rs. 8,705

    (3)   Rs. 10,208   (4)   Rs. 17,409

Directions : Questions No. 126 to 130. Read the following table and answer the questions given below it.

Age Group (in years)	Magazines Read						Total sample Surveyed (including nor-reader)	
	Sports		Film		Both			
	Male	Female	Male	Female	Male	Female	Male	Female
10-15	40	30	30	20	10	15	100	120
16-35	160	120	180	100	80	65	240	150
36-60	50	40	40	50	30	20	200	430

126. The number of people, who read at least one type of magazine and are over 35 years in age is :

    (1) 26   (2) 130   (3) 230   (4) 180

P.T.O.

127. The number of people in the age-group 10-15 who read only one type

of magazine is :

(1) 25   (2) 70   (3) 95   (4) 120

128. The number of females in the age-group 16-35 who do not read 'sports'

magazines is :

(1) 120   (2) 90   (3) 60   (4) 30

129. The number of males in the age-group 16-35 who do not read 'film'

magazines is :

(1) 60   (2) 80   (3) 140   (4) 190

130. What percent of people over 35 years do not read either type of

magazine ?

(1) 14%   (2) 50.27%   (3) 54%   (4) 79%

Directions : Questions No. 131 to **135.** Study the following table carefully and answer the questions given below it.

Production (in thousands) of Five Different Types of Toys and Percentage Defect over the years.

Year	Types of Toys									
	A		B		C		D		E	
	Prod.	% Defect	Prod.	% Defect	Prod.	% Defect	Prod.	% Defect	Prod.	% Defect
1991	76	5	58	11	39	5	59	9	28	8
1992	82	6	46	9	37	9	62	8	36	4
1993	65	8	49	8	45	6	47	12	42	15
1994	70	12	52	12	42	13	54	4	31	9
1995	85	9	64	14	38	11	57	7	49	11
1996	80	11	54	10	40	8	68	5	38	7

131. The average production of the given years of which of the following types of the toys was highest ?

(1) E   (2) B·   (3) A   (4) C

P.T.O.

132. What was the total number of defective B-type toys in 1995 and defective D-type toys in 1993 ?

(1) 11,120

(2) 14,600

(3) 13,920

(4) 14,260

133. Among the given years in which year the average *percentage defect* of all the five types of toys was lowest ?
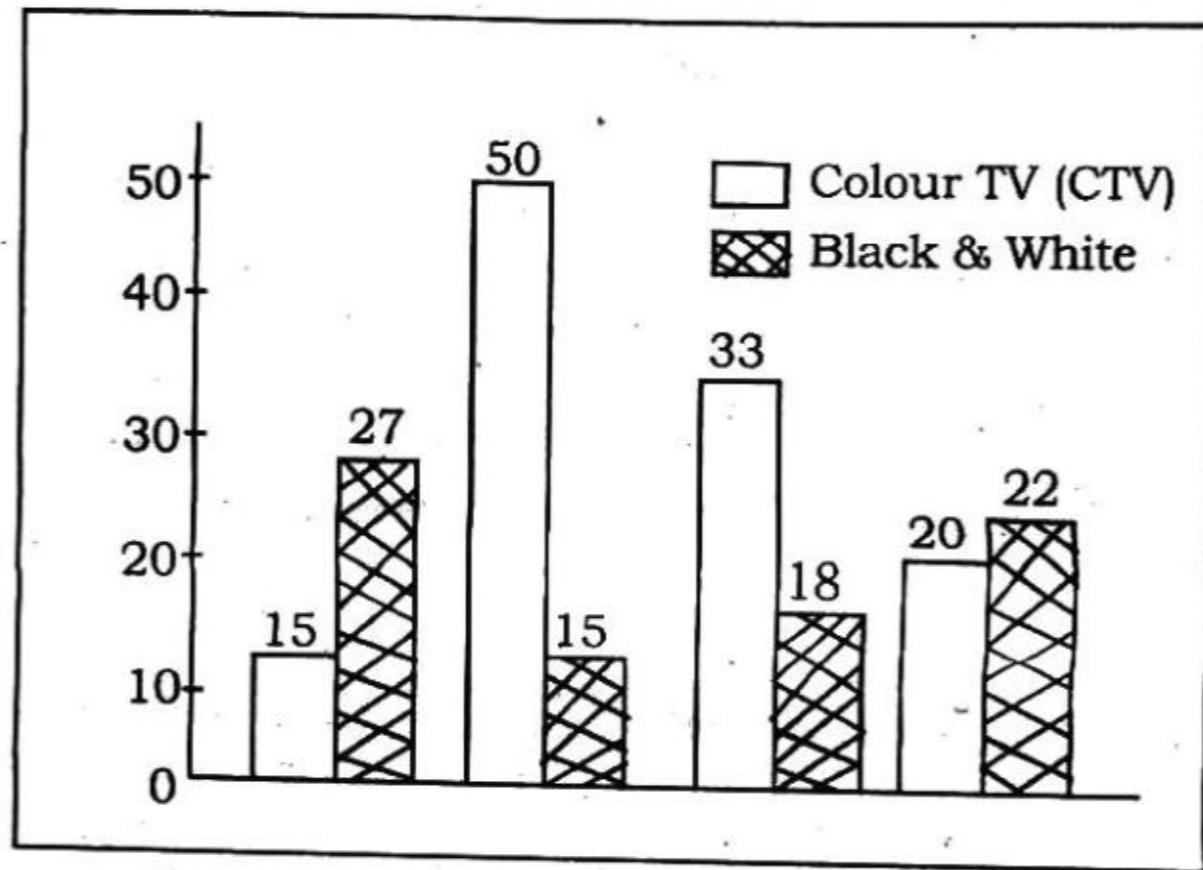
(1) 1992

(2) 1993

(3) 1995

(4) 1996

134. What was the difference in the number of defect free B-type toys between 1992 and 1993 ?

(1) 3220

(2) 2730

(3) 7700

(4) 3860

135. What was the average number of defect free toys of all types in 1994 ?

(1) 42,790

(2) 45,680

(3) 38,700

(4) 44,790

Directions : Questions NO. 136 to 140. Annual percentage growth of sale of Television sets over the years :

136. If the difference between the sale of black and white TVs in 1993 and 1994 was 3,000. What was the number of black and white TVs sold in 1994 ?

(1) 54,000

(2) 18,000

(3) 9,000

(4) Date inadequate

P.T.O.

137. In which of the following years was there a maximum drop in sales of CTVs ?

   (1) 1992   (2) 1993   (3) 1994   (4) 1995

138. Approximately what was the average percentage growth in sale of black and white TVs over the given years ?

   (1) 16   (2) 22   (3) 18   (4) 20

139. In the total number of colour TVs sold in 1994 was 1,40,000. What was the number of colour TVs sold in 1995 ?

   (1) 1,60,000   (2) 1,68,000

   (3) 1,70,000   (4) Data inadequate

140. What was the increase in the number of TVs sold from 1992 to 1993 ?

   (1) 31,000   (2) 70,000

   (3) 1,05,000   (4) Data inadequate

Directions : Question No. 141 to **145** The total population of a city is 5000. The various sections are indicated below in the circle diagram.

   I. Employees of the Public sector

   II. Employees of the Private sector

   III. Employees of the corporate sector

   IV. Self - employed

   V. Unemployed
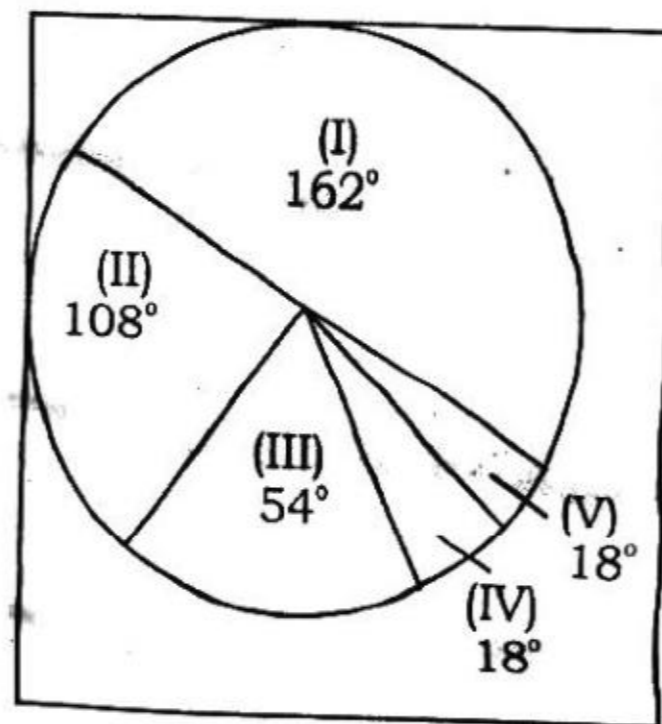
141. What percentage of employed persons is self-employed ?

   (1) 5%

   (2) $5\frac{5}{19}$%

   (3) 19%

   (4) 20%

P.T.O.

142. Number of persons employed in the corporate sector is :

(1) 250   (2) 500   (3) 750   (4) 1500

143. The number of unemployed persons is :

(1) 250   (2) 150   (3) 100   (4) 50

144. The number of persons employed in both the Public Sector and corporate sector is :

(1) 3750   (2) 3000   (3) 2500   (4) 2200

145. What percentage of the employed persons is employed in Private Sector ?

(1) $5\frac{5}{19}\%$ (2) $15\frac{15}{19}\%$ (3) $31\frac{11}{19}\%$ (4) $52\frac{12}{19}\%$

Directions : Question No. 146 to 150. Study the following graph carefully and answer the questions given below it.

Sale of Hardware by the Computer Industry over the Years
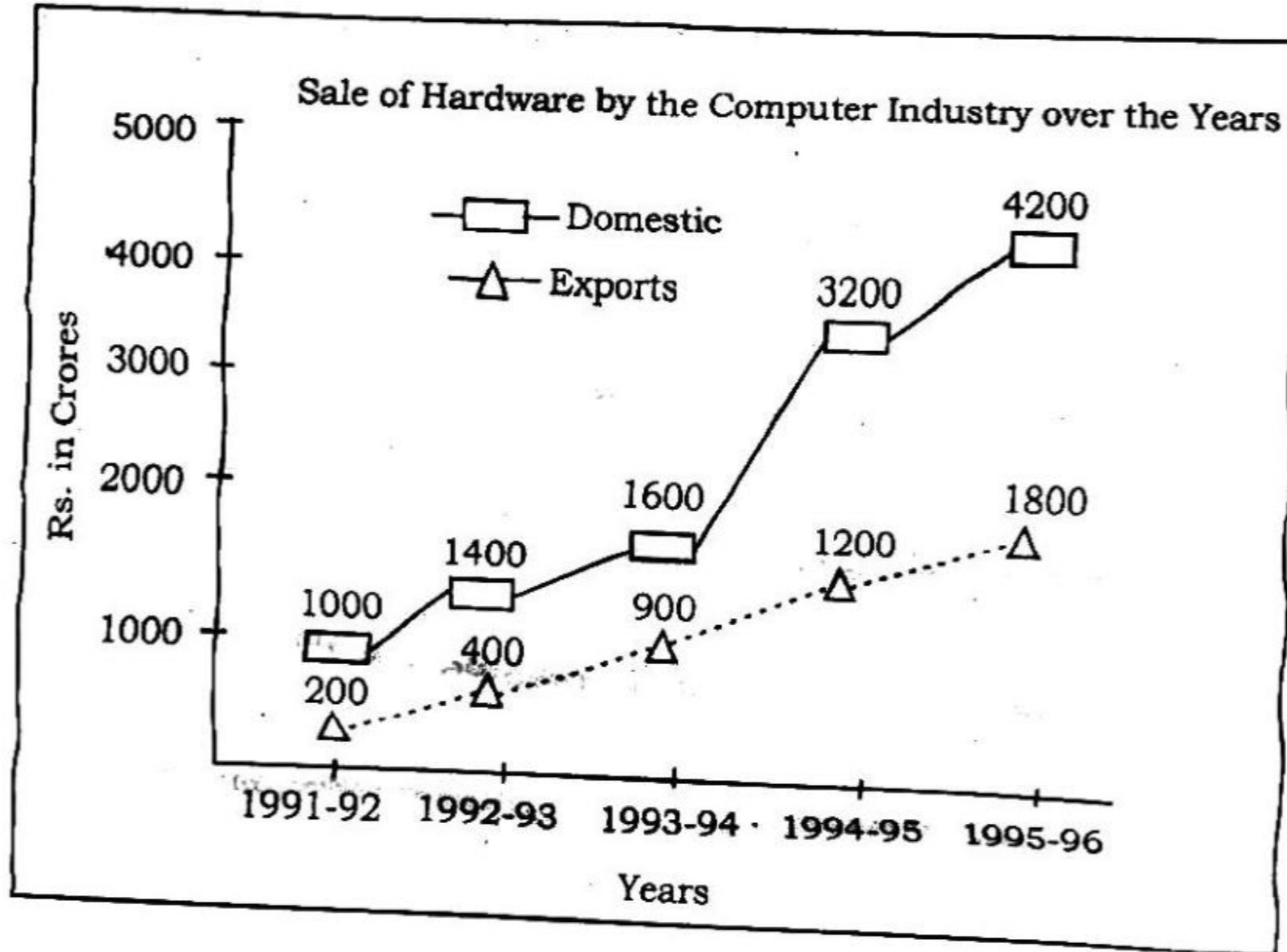
146. What was the difference in sale of hardware between domestic and exports in 1993-94 ?
   (1) Rs. 1,000 crores
   (2) Rs. 500 crores
   (3) Rs. 1,200 crores
   (4) Rs. 700 crores

147. In which of the following years was the percentage increase in sale of hardware in domestic sector maximum over the preceding year ?
   (1) 1992-93
   (2) 1993-94
   (3) 1994-95
   (4) 1992-93 and 1993-94

43

P.T.O.

148. What was the difference between the total hardware sale in exports sector in 1992-93 and 1993-94 together and hardware sale in domestic sector in 1993-94 ?

(1) Rs. 300 crores

(2) Rs. 200 crores

(3) Rs. 400 crores

(4) Rs. 150 crores

149. Approximately, what was the percentage increase in sale of hardware in domestic sector from 1994-95 to 1995-96 ?

(1) 35
(2) 25
(3) 40
(4) 30

150. What was the difference in the average sale of hardware between the domestic and exports sector ?

(1) Rs. 900 crores

(2) Rs. 1,380 crores

(3) Rs. 1,560 crores

(4) Rs. 60 crores

ROUGH WORK
रफ़ कार्य

45

P.T.O.

ROUGH WORK
रफ़ कार्य

ROUGH WORK
रफ़ कार्य

47

P.T.O.

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।

2. परीक्षा भवन में *लिफाफा रहित प्रवेश-पत्र के अतिरिक्त,* लिखा या सादा कोई भी खुला कागज साथ में न लायें।

3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। *केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।*

4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।

5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक *निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।*

6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।

7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।

8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये *निर्देशों के अनुसार पेन से गाढ़ा करना है।*

9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।

10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।

11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।

12. परीक्षा के उपरान्त केवल *ओ एम आर उत्तर-पत्र* परीक्षा भवन में जमा कर दें।

13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।

14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।