# 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*** ***पूर्णाङ्क : 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) $\log \frac{a}{b} = \log a + \log b$ (4) $\log a^b = \log a \times \log b$

**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 $7 \log \frac{16}{15} + 5 \log \frac{25}{24} + 3 \log \frac{81}{80}$ 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) $8\frac{2}{3}$ (2) $4\frac{1}{6}$ (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 $\frac{1}{x} + \frac{1}{z}$ is equal to :

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

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

(1) 2 (2) –2 (3) $\frac{1}{2}$ (4) 1

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

(1) 0 (2) –1 (3) 1 (4) 2

**09.** If $\log_5 \frac{125}{25} = x$, the value of x is :

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

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

(1) $\frac{21}{4}$ (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

**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) $\geq 2$ (2) $\leq 2$ (3) $\geq 0$ (4) $\leq 0$

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

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

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

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

**18.** If a > 0, b > 0, c > 0, then the value of $(a + b + c)\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ 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) $\frac{2}{b^n}$ (2) $\frac{1}{2}b^n$ (3) $2b^n$ (4) $\frac{3}{2}b^n$

**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) $\frac{1}{2}$ (4) $-\frac{1}{2}$

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

(1) |A| = 1 (2) |A| = ∞

(3) |A| ≠ 0 (4) |A| = 0

**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

**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) $3\,\lambda$

(2) $\lambda^3$

(3) $2\,\lambda$

(4) $\lambda^2$

**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) $A_1 = 2A_2$ (4) $A_1 = 3A_2$

**31.** If the $n^{th}$ term of a series is given by $\frac{3+n}{4}$, 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 $n^{th}$ term is m, then its $p^{th}$ 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 $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)$ 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) $-\frac{5}{7}$ (2) $\frac{5}{7}$ (3) $-\frac{3}{5}$ (4) $\frac{3}{5}$

**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) $\frac{xy}{x-y-1}$ (2) $\frac{xy}{x-y+1}$ (3) $\frac{xy}{x+y-1}$ (4) $\frac{xy}{x+y+1}$

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

(1) $\sqrt{\left(\frac{p}{q}\right)}$ (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) $pq$ (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

a b c

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

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

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

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

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

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

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

**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 $C_1 + 2C_2 + 3C_3 + .....+ nC_n$ 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 $\frac{1}{1!(n-1)!} + \frac{1}{3!(n-3)!} + \frac{1}{5!(n-5)!} + \ldots\ldots$ is equal to :

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

(3) $\frac{3^{n-1}}{(2n)!}$ (4) $\frac{3^{n+1}}{(3n)!}$

**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 ${}^{9}P_5 + 5.\ {}^{9}P_4 = {}^{10}P_r$, 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

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

**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 $\alpha$ and $\beta$ are the roots of $ax^2 + bx + c = 0$, then the equation whose roots are $\frac{1}{\alpha+\beta}, \frac{1}{\alpha}+\frac{1}{\beta}$ is :

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

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

**62.** If $\alpha \neq \beta$, but $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3$ then the equation whose roots are $\frac{\alpha}{\beta}$ and $\beta/\alpha$ 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 $\alpha$ 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 $\alpha, \beta$ be the roots of $ax^2 + 2bx + c = 0$ and , $\alpha + \delta, \beta + \delta$ be those of $Ax^2 + 2Bx + C = 0$, then :

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

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

**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

**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 $\left(\frac{1}{1-2i}+\frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$ in the form A + i B :

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

(3) $\frac{1}{5}+\frac{7}{5}i$ (4) $\frac{1}{5}-\frac{7}{5}i$

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

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

(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}

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

(1) ± (3 + 4i) (2) ± (3 – 4i)

(3) ± (4 + 3i) (4) ± (4 – 3i)

**78.** Put the number $\frac{1+7i}{(2-i)^2}$ in trigonometrical form, that is, in the form r $(\cos\theta + i \sin\theta)$, where r is a positive real number and $-\pi < \theta \leq \pi$.

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

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

**79.** The real values of x and y for which the equations $\frac{(1+i)x-2i}{3+i} + \frac{(2-3i)y+i}{3-i} = i$ 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, $\omega$, $\omega^2$ 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 $\alpha$ and $\beta$ are complex cube roots of unity, then the value of $a^3 + b^3$ is equal to :

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

**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) $\left(-\frac{3}{2}, -\frac{5}{2}\right)$

**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) $\frac{5}{\sqrt{2}}$ (3) $\frac{5}{2\sqrt{2}}$ (4) $\frac{5}{4\sqrt{2}}$

**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) $y^2 = \frac{1}{3}ax$ (2) $y^2 = \frac{2}{3}ax$ (3) $y^2 = \frac{1}{9}ax$ (4) $y^2 = \frac{4}{9}ax$

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

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

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

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

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

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

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

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

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

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

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

(1) 0 (2) $\infty$ (3) 1 (4) $-1$

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

$f(x)=\frac{\tan \pi[x-\pi]}{1+[x]^2}$ 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.

**93.** A cone is circumscribed to a sphere of radius r. When the volume of the cone is minimum, its altitude is :

(1) 2r (2) $\frac{1}{3}r^2$ (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 = $\pi$ 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

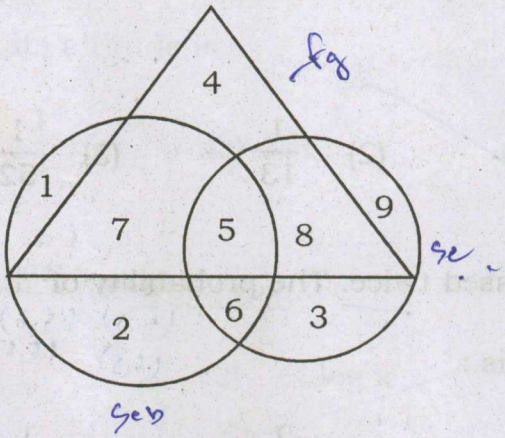
**99.** A die is tossed twice. The probability of 'a number greater than 4 on each toss' is :

(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 :




**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 :

**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

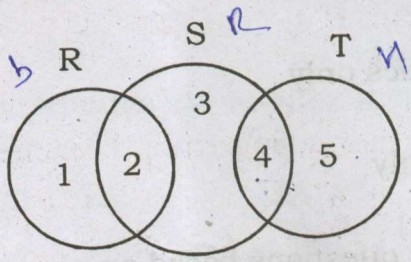
**110.** How many passed at least in one subject ?

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

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

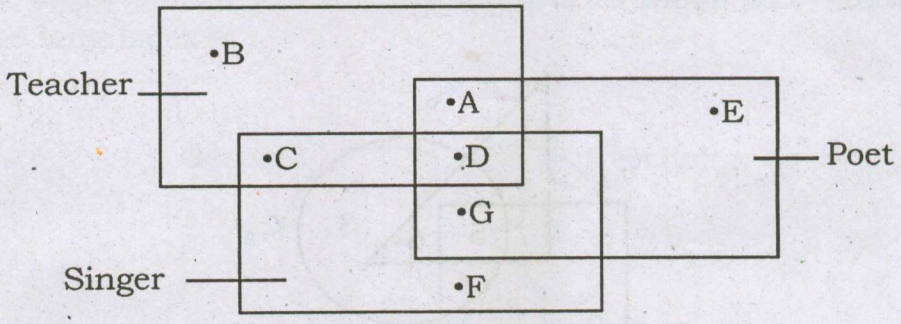
(1) 94 (2) 170 (3) 203 (4) 210

**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

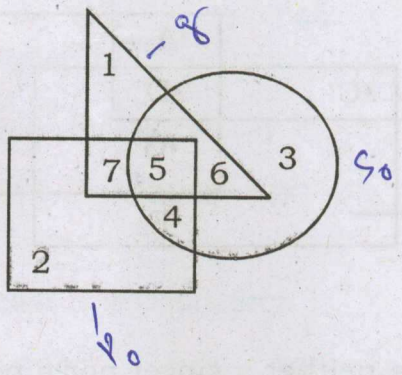
**115.** The teacher, who is singer and poet both is :

(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

**Directions : Questions No. 117** to **119.** These questions are based on th diagram given below. In the diagram, the triangle stands for graduates square for membership of professional organisations and the circle fo membership of social organisations. Read each statement and find ou 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

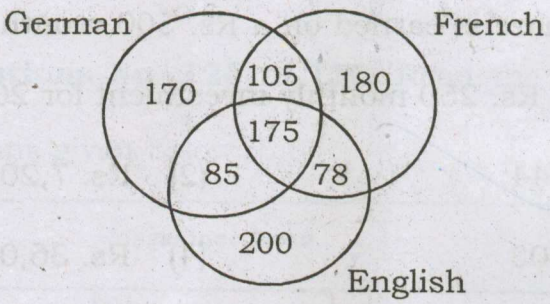
(1) 3 (2) 4 (3) 5 (4) 6

**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 :




(1) $\frac{1}{27}$ (2) $\frac{1}{25}$ (3) $\frac{7}{550}$ (4) $\frac{175}{1000}$

**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 |

92

87,047

**121.** How much total interest is earned on a 7% investment for a 5-yea 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 1 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 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-ye period to the interest earned over a 5 - year period with month 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

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

**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 ?

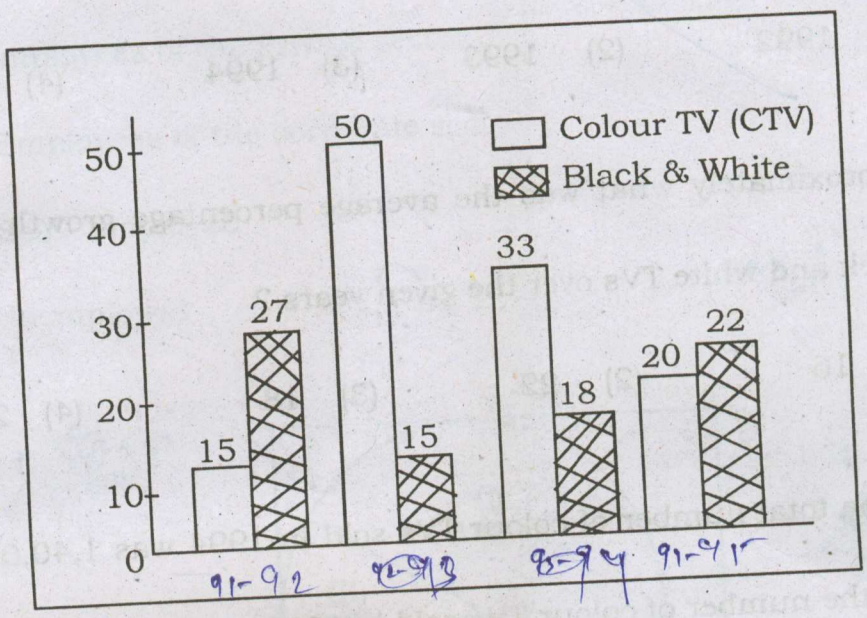
(1) 3220 (2) 2730 (3) 7700 (4) 3860

**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

**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.

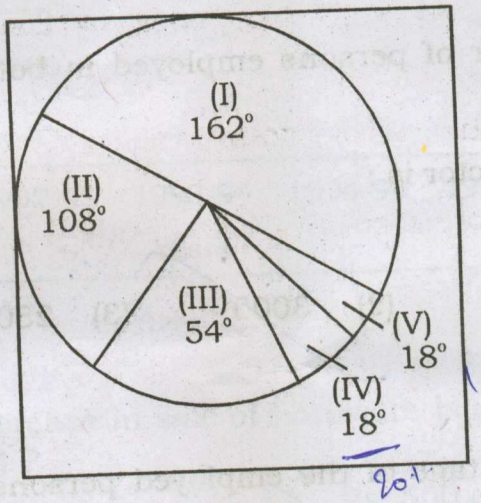
I. Employees of the Public sector

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%

**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

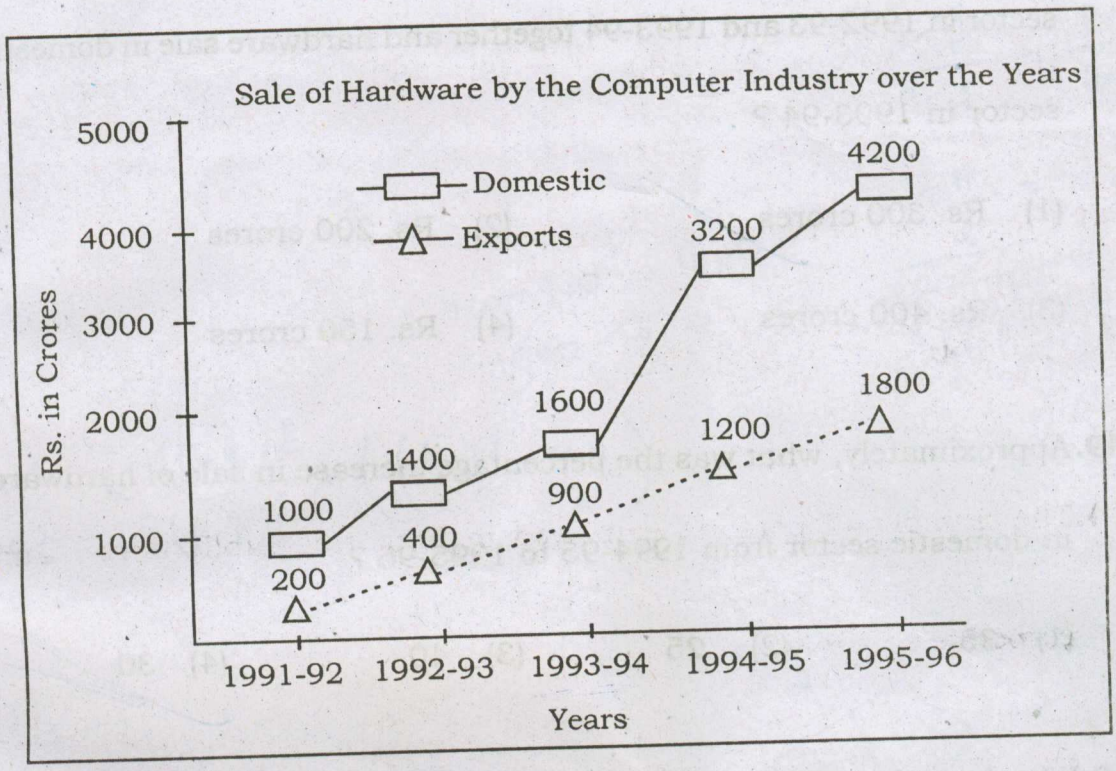
**144.** The number of persons employed in both the Public Sector and corporate sector is :

(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.




**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

**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