Question Paper of BHU MCA - 2010 (Set - 1)

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.

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

1. If a root of the equation $x^2 + px + q = 0$ and $x^2 + \alpha x + \beta = 0$ is common, then its value will be (where $p \neq \alpha$ and $q \neq \beta$) :

(1) $\frac{q-\beta}{\alpha-p}$ (2) $\frac{p\beta-\alpha q}{q-\beta}$

(3) $\frac{\alpha-\beta}{q-p}$ (4) $\frac{q-\beta}{\alpha-p}$ or $\frac{p\beta-\alpha q}{q-\beta}$

2. The equation $x-\frac{2}{x-1}=1-\frac{2}{x-1}$ has :

(1) no root (2) one root

(3) two equal roots (4) infinitely many roots

3. The set of values of p for which the roots of the equation $3x^2 + 2x + p\,(p-1)=0$ are of opposite signs is :

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

4. If z_1, z_2, z_3, z_4 are the vertices of a square in that order, then :

(1) $|z_1 - z_3| = |z_2 - z_4|$ (2) $|z_1 - z_3| = |z_1 - z_4|$

(3) $|z_2 - z_3| = |z_1 - z_3|$ (4) $|z_1 - z_2| = |z_2 - z_4|$

5. If z_1 and z_2 are two complex numbers (non-zero) such that $|z_1 + z_2| = |z_1| + |z_2|$, then $Arg\ z_1 - Arg\ z_2$ is equal to :

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

6. If $i=\sqrt{-1}$, then $4+5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334}+3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365}$ is equal to :

(1) $1-i\sqrt{3}$ (2) $-1+i\sqrt{3}$ (3) $i\sqrt{3}$ (4) $i\sqrt{3}$

7. Series $\frac{1}{1.2}+\frac{1}{2.3}+\frac{1}{3.4}+\cdots+\frac{1}{n(n+1)}$ is equal to :

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

8. The sum of first n natural numbers is :

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

9. If nth term of an A. P., be $(2n-1)$, then the sum of first n terms will be :

(1) n^2-1 (2) $(2n-1)^2$ (3) n^2 (4) n^2+1

10. If A_1, A_2 be two arithmetic means between $\frac{1}{3}$ and $\frac{1}{24}$, then their values are :

(1) $\frac{7}{72}, \frac{5}{36}$ (2) $\frac{17}{72}, \frac{5}{36}$ (3) $\frac{7}{36}, \frac{5}{72}$ (4) $\frac{5}{72}, \frac{17}{72}$

11. If the 10th term of a G. P. is 9 and 4th term is 4, then its 7th term is :

(1) 6 (2) 36 (3) $\frac{4}{9}$ (4) $\frac{9}{4}$

12. If G be the Geometric Mean of x and y, then $\frac{1}{G^2-x^2}+\frac{1}{G^2-y^2}$ is equal to :

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

13. A G. P. consists of an even number of terms. If the sum of all the terms is 5 times the sum of the terms occupying odd places, the common ratio will be :

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

14. If the A. M. and G. M. of the roots of a quadratic equation in x are p and q respectively, then its equation is :

(1) $x^2-2px+q^2=0$ (2) $x^2+2px+q^2=0$

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

15. Given positive integers $r>1$ and $n>2$ and that co-efficients 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) $n=2r-1$

16. The value of ${}^{n}P_{r}$ is equal to :

(1) ${}^{n-1}P_{r} + r.\,{}^{n-1}P_{r-1}$ (2) $n.\,{}^{n-1}P_{r} + {}^{n-1}P_{r-1}$

(3) $n\left({}^{n-1}P_{r} + {}^{n-1}P_{r-1}\right)$ (4) ${}^{n-1}P_{r-1} + {}^{n-1}P_{r}$

17. If ${}^{15}C_{3r} = {}^{15}C_{r+3}$, then r is equal to :

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

18. The value of the determinant

$$\begin{vmatrix} x+1 & x+2 & x+4 \\ x+3 & x+5 & x+8 \\ x+7 & x+10 & x+14 \end{vmatrix} \text{ is :}$$

(1) 2 (2) x^2+2 (3) -2 (4) x^2-1

19. If A is a singular matrix, then $Adj\ A$ is :

(1) Symmetric (2) Singular (3) Non-singular (4) Not defined

20. If $2x+3y-5z=7,\ x+y+z=6,\ 3x-4y+2z=1$, then x is equal to :

(1) $\begin{vmatrix} 2 & -5 & 7 \\ 1 & 1 & 6 \\ 3 & 2 & 1 \end{vmatrix} \div \begin{vmatrix} 7 & 3 & -5 \\ 6 & 1 & 1 \\ 1 & -4 & 2 \end{vmatrix}$ (2) $\begin{vmatrix} -7 & 3 & -5 \\ -6 & 1 & 1 \\ -1 & -4 & 2 \end{vmatrix} \div \begin{vmatrix} 2 & 3 & -5 \\ 1 & 1 & 1 \\ 3 & -4 & 2 \end{vmatrix}$

(3) $\begin{vmatrix} 7 & 3 & -5 \\ 6 & 1 & 1 \\ 1 & -4 & 2 \end{vmatrix} \div \begin{vmatrix} 2 & 3 & -5 \\ 1 & 1 & 1 \\ 3 & -4 & 2 \end{vmatrix}$ (4) $\begin{vmatrix} -5 & 2 & 7 \\ 1 & 6 & 1 \\ 3 & 2 & 1 \end{vmatrix} \div \begin{vmatrix} 7 & 3 & 5 \\ 6 & 1 & 1 \\ 1 & 4 & -2 \end{vmatrix}$

21. Let $A = \{x : x \text{ is a multiple of } 3\}$ and $B = \{x : x \text{ is a multiple of } 5\}$. Then $A \cap B$ is given by :

(1) $\{3, 6, 9, \cdots\}$ (2) $\{5, 10, 15, 20, \cdots\}$

(3) $\{15, 30, 45, \cdots\}$ (4) ϕ

22. Suppose $A_1, A_2, A_3, \cdots, A_{30}$ are thirty sets each having 5 elements and $B_1, B_2, B_3, \cdots, B_n$ are n sets each having 3 elements, let $\bigcup_{i=1}^{30} A_i - \bigcup_{j=1}^{n} B_j = s$ and each element of s belongs to exactly 10 of A_i's and exactly 9 of B_j's Then n is equal to :

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

23. Two finite sets having m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. The values of m and n are :
(1) 7, 6 (2) 6, 3 (3) 5, 1 (4) 8, 7

24. The number of non-empty subsets of $\{1, 2, 3, 4\}$ is :
(1) 14 (2) 15 (3) 16 (4) 17

25. In a class of 100 students, 55 students have passed in Mathematics and 67 students have passed in Physics. Then the number of students who have passed in Physics only is :
(1) 22 (2) 33 (3) 10 (4) 45

26. Let $A = \{a, b, c\}$ and $B = \{1, 2\}$. Consider a relation from set A to set B. Then R is subset of :
(1) A (2) B (3) $A \times B$ (4) $B \times A$

27. Two points A and B have the co-ordinates (1, 0) and (−1, 0) respectively and O is a point which satisfies the relation $AO - BO = \pm 1$, then the locus of O is :
(1) $12x^2 + 4y^2 = 3$ (2) $12x^2 - 4y^2 = 3$
(3) $12x^2 + 4y^2 + 3 = 0$ (4) $12x^2 - 4y^2 + 3 = 0$

28. If the vertices of a quadrilateral are A (0, 0), B (3, 4), C (7, 7), and D (4, 3), then the quadrilateral $ABCD$ is :
(1) Parallelogram (2) Rectangle (3) Square (4) Rhombus

29. The distance of the middle point of the line joining the points ($a \sin\theta$, 0) and (0, $a \cos\theta$) from the origin is :
(1) $\frac{a}{2}$ (2) $\frac{1}{2}a(\sin\theta + \cos\theta)$
(3) $a(\sin\theta + \cos\theta)$ (4) a

30. If D (2, 1), E (−1, −2) and F (3, 3) are mid-points of the sides BC, CA and AB of the triangle ABC, then the equation of AB is :
(1) $x + y = 6$ (2) $3x + y = 12$ (3) $x + y = 0$ (4) $x - y = 0$

31. If $\frac{1}{ab'} + \frac{1}{ba'} = 0$, then the lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b'} + \frac{y}{a'} = 1$ are :
(1) Parallel (2) Inclined at 60° to each other
(3) Perpendicular to each other (4) Inclined at 30° to each other

32. If a circle whose centre is (1, –3) touch the line $3x-4y=5$, then the radius of the circle is :

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

33. The equation of circle in the first quadrant touching each coordinate axis at a distance of one unit from the origin is :

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

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

34. If $\lambda x^2-10xy+12y^2+5x-16y-3=0$ represents a pair of straight line, then λ is :

(1) 1 (2) 2 (3) 3 (4) –1

35. The line, represented by the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ will be equidistance from the origin, if :

(1) $f^2+g^2=c(b-a)$ (2) $f^4+g^2=c\left(bf^2+ag^2\right)$

(3) $f^4-g^4=c\left(bf^2-ag^2\right)$ (4) $f^2+g^2=af^2+bg^2$

36. The vertex of the parabola $y^2-4y-2x-8=0$ is at the point :

(1) (–6, 2) (2) $\left(-\frac{11}{2},2\right)$ (3) $\left(\frac{1}{2},0\right)$ (4) $\left(-\frac{13}{2},2\right)$

37. 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) ax_1 (4) $a+x_1$

38. The locus of the middle points of chords of 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) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{y}{a}$

39. The straight line $x\cos\alpha+y\sin\alpha=p$ touches the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ if :

(1) $p^2=a^2\sin^2\alpha-b^2\cos^2\alpha$ (2) $p^2=a^2\sin^2\alpha+b^2\cos^2\alpha$

(3) $p^2=a^2\cos^2\alpha-b^2\sin^2\alpha$ (4) $p^2=a^2\cos^2\alpha+b^2\sin^2\alpha$

40. If the line $lx+my=n$ touches the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ if :

(1) $al+bm=n$ (2) $a^2l^2+b^2m^2=n^2$

(3) $al-bm=n$ (4) $a^2l^2-b^2m^2=n^2$

41. The locus of the pole of normal chords of hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is :

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

(3) $\frac{a^6}{x^2}-\frac{b^6}{y^2}=(a^2+b^2)^2$ (4) $\frac{a^4}{x^2}-\frac{b^4}{y^2}=a^2+b^2$

42. The value of $\lim_{x\to\alpha}\frac{x^n-\alpha^n}{x-\alpha}$ is equal to :

(1) 0 (2) 1 (3) $\log\alpha$ (4) $n\alpha^{n-1}$

43. Find the limit of the function $\frac{\tan x-\sin x}{\sin^3 x}$ as $x\to 0$:

(1) 0 (2) $\frac{1}{2}$ (3) 1 (4) ∞

44. The function $f(x)=\frac{x-1}{1+e^{1/(x-1)}}, x\neq 0$ is continuous for $x=1$ when $f(1)$ equals :

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

45. The value of $\frac{d}{dx}[\log(\log x)]$ is equal to :

(1) $(x\log x)^{-1}$ (2) $x\log x$ (3) $\frac{x}{\log x}$ (4) $\frac{\log x}{x}$

46. If $y=\sqrt{\frac{1+\tan x}{1-\tan x}}$, then $\frac{dy}{dx}$ is equal to :

(1) $\frac{1}{2}\sqrt{\frac{1-\tan x}{1+\tan x}}\sec^2\left(\frac{\pi}{4}+x\right)$ (2) $\sqrt{\frac{1-\tan x}{1+\tan x}}\sec^2\left(\frac{\pi}{4}+x\right)$

(3) $\frac{1}{2}\sqrt{\frac{1-\tan x}{1+\tan x}}\sec\left(\frac{\pi}{4}+x\right)$ (4) $\sqrt{\frac{1-\tan x}{1+\tan x}}\sec\left(\frac{\pi}{4}+x\right)$

47. The tangent line is perpendicular to the x-axis to the curve $x=t^2-1, y=t^3-t$, at the point :

(1) $t=-\frac{1}{\sqrt{3}}$ (2) $t=0$ (3) $t=\frac{1}{\sqrt{3}}$ (4) ∞

48. The straight line $\frac{x}{a}+\frac{y}{b}=1$ touches the curve $y=be^{-x/a}$ at the point :

(1) Where it crosses the x-axis (2) Where it crosses the y-axis

(3) (0, 0) (4) (1, 1)

49. The equation of the normal to the curve $y(x-2)(x-3)-x+7=0$ at the point where it cuts the axis of x is :

(1) $y=4x-144$ (2) $3x-2y=2$ (3) $y+2x=140$ (4) $y-2x=144$

50. The normal to the curve $x=a(\cos\theta+\theta\sin\theta)$, $y=a(\sin\theta-\theta\cos\theta)$ at any point θ is such that it :

(1) passes through the origin
(2) is at constant distance from the origin
(3) makes a constant angle with the x-axis
(4) makes a constant angle with the y-axis

51. The maximum value of $f(\theta)= a\sin\theta + b\cos\theta$ is :

(1) $\frac{a}{b}$ (2) $\frac{a}{\sqrt{a^2+b^2}}$ (3) $\sqrt{ab}$ (4) $\sqrt{a^2+b^2}$

52. The maximum value of $\frac{(5+x)(2+x)}{1+x}$ for non-negative real x is :

(1) 12 (2) 10 (3) 9 (4) 8

53. Let $f(x)=\frac{x^2-1}{x^2+1}$, for every real number x, then the minimum value of f :

(1) does not exist because f is unbounded
(2) is not attained even through f is bounded
(3) is equal to 1
(4) is equal to –1

54. The minimum value of $_e(2x^2-2x+1)\sin^2 x$ is :

(1) e (2) $\frac{1}{e}$ (3) 1 (4) 0

55. If $\int x\sin x = -x\cos x+\alpha$, then α is :

(1) $\sin x + c$ (2) $\cos x + c$ (3) c (4) $\sin x\cos x$

56. The value of $\int\frac{dx}{\cos^2 x(1-\tan x)^2}$ is equal to :

(1) $\frac{1}{\tan x-1}+c$ (2) $\frac{1}{1-\tan x}+c$

(3) $-\frac{1}{3(1-\tan x)^3}+c$ (4) $-\frac{1}{5(1-\tan x)^5}+c$

57. The value of $\int \frac{x-1}{(x-2)(x-3)}dx$ is equal to :

(1) $-\log(x-2)+2\log(x-3)$ (2) $\log(x-2)-2\log(x-3)$

(3) $-\log(x-2)+\log(x-3)$ (4) $\log(x-2)-\log(x-3)$

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

(1) $\pi \log \frac{1}{2}$ (2) $-\pi \log \frac{1}{2}$ (3) $\frac{\pi}{2}\log 2$ (4) $-\frac{\pi}{2}\log 2$

59. If r is the radius of a sphere, then its volume and surface are :

(1) $\frac{1}{3}\pi r^3 ; 2\pi r^2$ (2) $\frac{2}{3}\pi r^3 ; 3\pi r^2$ (3) $\frac{4}{3}\pi r^3 ; 4\pi r^2$ (4) $\frac{3}{4}\pi r^3 ; 3\pi r^2$

60. If r radius of the base, h height and α is semi-vertical angle of the cone, then its volume and surface are :

(1) $\pi r^2 h ; \frac{1}{3}\pi h^2 \tan\alpha \sec\alpha$ (2) $\frac{1}{3}\pi r^2 h ; \pi h^2 \tan\alpha \sec\alpha$

(3) $\frac{1}{2}\pi r^2 h ; \frac{1}{2}\pi h^2 \tan\alpha \sec\alpha$ (4) $\pi r^2 h ; 2\pi h^2 \tan\alpha \sec\alpha$

61. The solution of $\frac{dy}{dx} = e^x(\sin x + \cos x)$ is :

(1) $y = e^x(\sin x - \cos x)+c$ (2) $y = e^x(\cos x - \sin x)+c$

(3) $y = e^x \sin x + c$ (4) $y = e^x \cos x + c$

62. The solution of differential equation $\frac{dy}{dx} = \frac{y-x}{y+x}$ is :

(1) $\log_e(x^2+y^2)+2\tan^{-1}\frac{y}{x}+c=0$ (2) $\frac{y^2}{2}+y = xy-\frac{x^2}{2}+c$

(3) $\left(1+\frac{x}{y}\right)y = \left(1-\frac{x}{y}\right)x+c$ (4) $y = x-2\log_e y+c$

63. An integrating factor for the differential equation $(1+y^2)dx-(\tan^{-1}y-x)dy=0$, is :

(1) $\tan^{-1}y$ (2) $e^{\tan^{-1}y}$ (3) $\frac{1}{1+y^2}$ (4) $\frac{1}{x(1+y)}$

64. Solution of differential equation $2xy\frac{dy}{dx} = x^2+3y^2$ is :

(1) $x^3+y^2 = ex^2$ (2) $\frac{x^2}{2}+\frac{y^3}{x} = y^2+c$ (3) $x^2+y^3 = cx^2$ (4) $x^2+y^2 = cx^3$

where c is a constant.

65. The solution of the differential equation $x\log x\frac{dy}{dx}+y=2\log x$ is :

(1) $y=\log x+c$ (2) $y=\log x^2+c$

(3) $y\log x=(\log x)^2+c$ (4) $y=x\log x+c$

66. If $\vec{a},\vec{b},\vec{c}$ are the position vectors of the vertices A, B, C of the triangle ABC, then the centroid of triangle ABC is :

(1) $\frac{\vec{a}+\vec{b}+\vec{c}}{3}$ (2) $\frac{1}{2}\left(\vec{a}+\frac{\vec{b}+\vec{c}}{3}\right)$ (3) $\vec{a}+\frac{\vec{b}+\vec{c}}{2}$ (4) $\frac{\vec{a}+\vec{b}+\vec{c}}{2}$

67. If $\vec{a}+\vec{b}=\vec{b}\times\vec{c}\neq 0$, where $\vec{a},\vec{b}$ and $\vec{c}$ are coplaner vectors, then for some scalar k :

(1) $\vec{a}+\vec{c}=k\vec{b}$ (2) $\vec{a}+\vec{b}=k\vec{c}$ (3) $\vec{b}+\vec{c}=k\vec{a}$ (4) $\vec{b}+\vec{c}=\frac{k}{\vec{a}}$

68. If the vectors $\vec{a},\vec{b},\vec{c}$ from the sides BC, CA and AB respectively, of a triangle ABC, then :

(1) $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}=0$ (2) $\vec{a}\times\vec{b}=\vec{b}\times\vec{c}=\vec{c}\times\vec{a}$

(3) $\vec{a}.\vec{b}=\vec{b}.\vec{c}=\vec{c}.\vec{a}$ (4) $\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}=0$

69. A tetrahedron has vertices at O(0, 0, 0), $P(1, 2, 1)$, $Q(2, 1, 3)$ and $R(-1, 1, 2)$. Then the angle between the faces OPQ and POR will be :

(1) 30° (2) 90° (3) $\cos^{-1}\left(\frac{19}{35}\right)$ (4) $\cos^{-1}\left(\frac{71}{31}\right)$

70. If $\vec{a}=-3\hat{i}+7\hat{j}+5\hat{k}$, $\vec{b}=-3\hat{i}+7\hat{j}-3\hat{k}$ and $\vec{c}=7\hat{i}-5\hat{j}-3\hat{k}$ are three coterminus edges of a parallelopiped, then its volume is :

(1) 108 (2) 210 (3) 272 (4) 308

71. The value of $\cos 15^\circ$ is equal to :

(1) $\pm\sqrt{\frac{1-\cos 30^\circ}{2}}$ (2) $\pm\sqrt{\frac{1+\cos 30^\circ}{2}}$ (3) $\sqrt{\frac{1-\cos 30^\circ}{2}}$ (4) $\sqrt{\frac{1+\cos 30^\circ}{2}}$

72. If $\sin^2\theta-2\cos\theta+\frac{1}{4}=0$, then the general value of θ is :

(1) $n\pi\pm\frac{\pi}{3}$ (2) $2n\pi\pm\frac{\pi}{3}$ (3) $2n\pi\pm\frac{\pi}{6}$ (4) $n\pi\pm\frac{\pi}{6}$

73. The value of $\cos\left[\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{2}\right]$ is equal to :

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

74. In a ΔABC, if $\frac{\cos A}{a}=\frac{\cos B}{b}=\frac{\cos C}{c}$ and the side $a = 2$, then the area of the triangle is :

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

75. The angle of elevation of the top of a tower at a point on the ground is 30°. If on walking 20 metres towards the tower the angle of elevation becomes 60°, then the height of the tower is :

(1) 20 metres (2) 10 metres

(3) $10\sqrt{3}$ metres (4) $\frac{10}{\sqrt{3}}$ metres

76. The angle of elevation of sun, when the shadow of the pole is $\sqrt{3}$ times the height of the pole is :

(1) 60° (2) 30° (3) 45° (4) 15°

77. Two events A and B having probabilities 0.25 and 0.50 respectively. The probabilities that both A and B occur simultaneously is 0.14. Then the probability that neither A nor B occur is :

(1) 0.39 (2) 0.25 (3) 0.11 (4) 0.06

78. Two cards are drawn one by one at random from a pack of 52 cards. The probability that both of them are king, is :

(1) $\frac{2}{13}$ (2) $\frac{1}{169}$ (3) $\frac{1}{221}$ (4) $\frac{30}{221}$

79. The relationship between mean, median and mode for a moderately skewed distribution is :

(1) mode = median − 2 mean (2) mode = 2 median − mean

(3) mode = 3 median − 2 mean (4) mode = 2 median − 3 mean

80. The mean of discrete observations :

$y_1, y_2, y_3, \ldots\ldots\ldots\ldots, y_n$ is given by :

(1) $\frac{\sum_{i=1}^{n} y_i}{n}$ (2) $\frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} i}$ (3) $\frac{\sum_{i=1}^{n} y_i f_i}{n}$ (4) $\frac{\sum_{i=1}^{n} y_i f_i}{\sum_{i=1}^{n} f_i}$

81. Which of the following is ***not*** a measure of dispersion ?
(1) variance
(2) mean deviation
(3) standard-deviation
(4) mode

82. For a frequency distribution, the mean deviation about mean is computed by :

(1) M. D. $= \frac{\Sigma d_i}{\Sigma f_i}$ (2) M. D. $= \frac{\Sigma f_i d_i}{\Sigma f_i}$

(3) M. D. $= \frac{\Sigma f_i |d_i|}{\Sigma f_i}$ (4) M. D. $= \frac{\Sigma f_i}{\Sigma f_u |d_i|}$

83. If r is the coefficient of correlation, then :
(1) $r \geq 1$ (2) $r \leq 1$ (3) $|r| \geq 1$ (4) $|r| \leq 1$

84. A binomial distribution tends to a normal distribution when frequency becomes :
(1) very large (2) very small (3) unity (4) zero

85. The point at which the maximum value of $(3x + 2y)$ subject to the constraints $x + y \leq 2, x \geq 0, y \geq 0$ is obtained :
(1) (0, 0) (2) (1.5, 1.5) (3) (2, 0) (4) (0, 2)

86. If the constraints in a L.P.P. are changed :
(1) The problem is to be re-evaluated
(2) The solution is not defined
(3) The objective function has to be modified
(4) The change in constrained is ignored

87. Which of the terms is ***not*** used in a linear programming problem ?
(1) Slack variables (2) Objective function
(3) Concave region (4) Feasible solution

88. Inequations $3x - y \geq 3$ and $4x - y > 4$:
(1) have solution for positive x and y (2) have no solution for positive x and y
(3) have solution for all x (4) have solution for all y

89. If the resultant of two forces of magnitudes P and 2P is perpendicular to P, then the angle between the forces is :

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

90. Three forces P, Q, R are acting at a point in a plane. The angle between P and Q, Q and R are 130° and 120° respectively, then for the equilibrium, forces P, Q, R are in the ratio :

(1) $1:2:3$ (2) $1:2:\sqrt{3}$

(3) $3:2:1$ (4) $\sqrt{3}:2:1$

91. Two like parallel forces P and Q act on a rigid body at A and B respectively. If P and Q be interchanged in position, show that the point of application of the resultant be displaced through a distance d along AB, where d :

(1) $\frac{P+Q}{P-Q}AB$ (2) $\frac{P-Q}{P+Q}AB$ (3) $\frac{2P+Q}{2P-Q}AB$ (4) $\frac{P-Q}{2P+Q}AB$

92. If the forces 6 W, 5 W acting at a point (2, 3) in Cartesian rectangular co-ordinates are parallel to the positive x and y-axis respectively, then the moment of the resultant force about the origin is :

(1) 8 W (2) -3 W (3) 3 W (4) -8 W

93. A horizontal rod AB is suspended at its ends by two vertical strings. The rod is of length 0.6 metre and weights 3 units. Its centre of gravity G is at a distance 0.4 metre from A. Then the tension of string at A, in same unit is :

(1) 0.2 (2) 0.8 (3) 1.4 (4) 1.0

94. If A, B, C are three forces in equilibrium acting at a point and if 60°, 150°, 150° respectively denote the angles between A and B, B and C and C and A, then the forces are in proportion of :

(1) $\sqrt{3}:1:1$ (2) $1:1:\sqrt{3}$ (3) $1:\sqrt{3}:1$ (4) $1:2.5:2.5$

95. A body is moving in a straight line with uniform acceleration. It covers distances 10 m and 12 m in third and fourth second respectively, then the initial velocity in m/sec is :

(1) 2 m/sec (2) 3 m/sec (3) 4 m/sec (4) 5 m/sec

96. A train starts, from station A with uniform acceleration f_1 for some distance and then goes with uniform retardation f_2 for some more distance to come to rest at station B. The distance between the stations A and B is 4 km and the train takes 4 minutes to complete this journey. If f_1 and f_2 are in km - minute units, then

$\frac{1}{f_1}+\frac{1}{f_2}=$

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

97. Two particles A and B are dropped from the heights of 5 m and 20 m respectively. Then the ratio of time taken by A to that taken by B, to reach the ground is :

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

98. Two balls are projected simultaneously with the same velocity from the top of tower, one vertically upwards and the other vertically downwards. If they reach the ground in times t_1 and t_2 respectively, then the height of tower is :

(1) $\frac{1}{2}g t_1 t_2$ (2) $\frac{1}{2}g(t_1^2 + t_2^2)$ (3) $\frac{1}{2}g(t_2^2 - t_1^2)$ (4) $\frac{1}{2}g(t_1 + t_2)^2$

99. A particle is projected with initial velocity u and making an angle α with the horizontal, its time of flight will be given by :

(1) $\frac{2u\sin\alpha}{g}$ (2) $\frac{2u^2\sin\alpha}{g}$

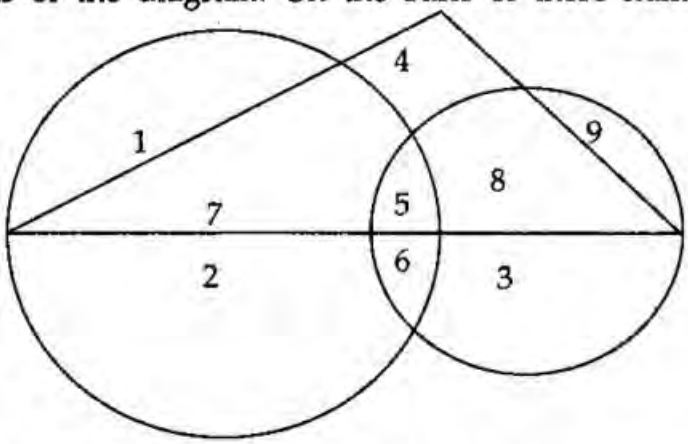
(3) $\frac{u\sin\alpha}{g}$ (4) $\frac{u^2\sin^2\alpha}{g}$

100. The rate of doing work per unit of time is called :

(1) Impulse (2) Work (3) Energy (4) Power

Directions : (Question Nos. 101-105) :

These questions are based on the following diagram in which the triangle represents female graduates, small circle represents 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 the 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 ?

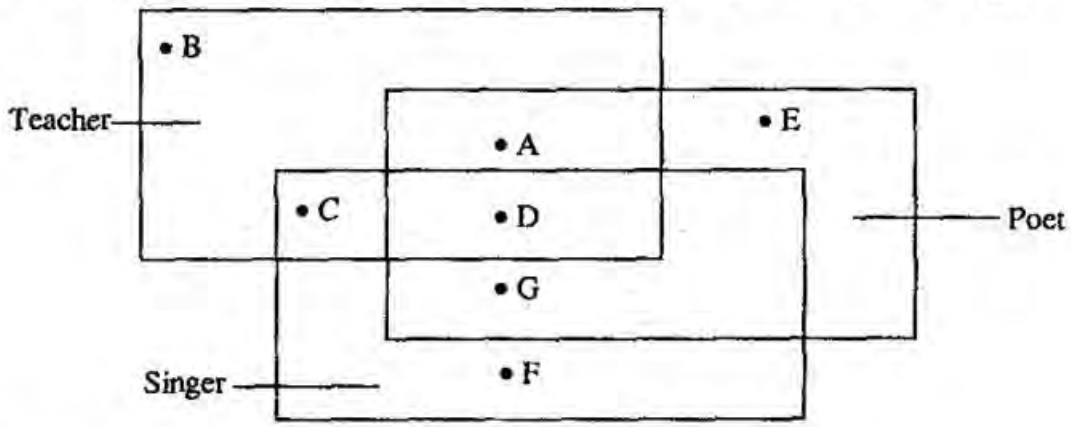
(1) 12 (2) 13 (3) 20 (4) 15

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

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

Directions : (Question Nos. 106-109) :

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 :



106. The teacher who is neither a singer nor a poet is :

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

107. The teacher who is a singer but ***not*** a poet is :

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

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

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

109. The poet, who is neither a singer nor a teacher, is

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

Directions : (Question Nos. **110-115***) :*
Which number is wrong in the given series ?

110. 6, 18, 36, 108, 216, 648, 1290, 3888 :
(1) 36 (2) 108 (3) 1290 (4) 648

111. 5, 7, 13, 25, 44, 75, 117 :
(1) 7 (2) 13 (3) 25 (4) 44

112. 2, 3, 6, 15, 52.5, 157.5, 630 :
(1) 15 (2) 52.5 (3) 157.5 (4) 3

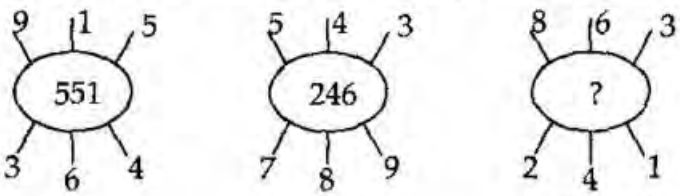
113. 1, 4, 8, 6, 9, 12, 16, 14, 17, 23, 24, 22 :
(1) 24 (2) 23 (3) 17 (4) 22

114. 4, 10, 6, 11, 17, 12, 20, 24, 20, 31, 37 :
(1) 20 (2) 24 (3) 31 (4) 37

115. 1, 2, 9, 37, 65, 126, 217 :
(1) 2 (2) 9 (3) 37 (4) 65

Directions : (Question Nos. **116-120***) :*
Which number should come in place of question mark (?) in the following questions :

116.



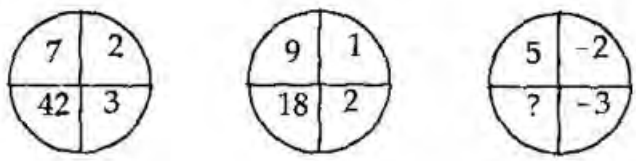
(1) 631 (2) 622 (3) 624 (4) 262

117.

9	5	6
5	7	?
3	4	5
135	140	150

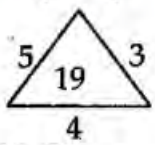
(1) 8 (2) 10 (3) 5 (4) 4

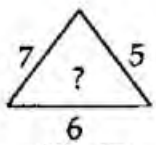
118.

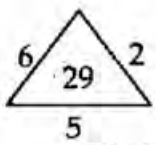


(1) 18 (2) 13 (3) 30 (4) -30

119.

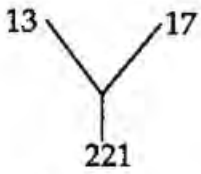


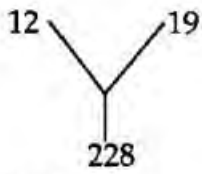


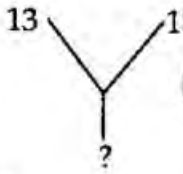


(1) 25 (2) 47 (3) 37 (4) 41

120.







(1) 31 (2) 229 (3) 234 (4) 312

***Directions : (Question Nos.* 121-125) :**

The following five questions are based on statements. Read them carefully and find the correct answer out of the alternatives given under each.

Madhu and Shivani are good in Dramatics and Computer Science.

Asha and Madhu are good in Computer Science and Physics.

Asha, Pratibha and Namita are good in Physics and History.

Namita and Asha are good in Physics and Mathematics.

Pratibha and Shivani are good in History and Dramatics.

121. Who is good in Physics, History and Mathematics, but not in Computer Science ?

(1) Asha (2) Pratibha

(3) Madhu (4) Namita

122. Who is good in History, Physics, Computer Science and Mathematics ?

(1) Asha (2) Namita

(3) Madhu (4) Pratibha

123. Who is good in Physics, History and Dramatics ?

(1) Madhu (2) Pratibha

(3) Shivani (4) Asha

124. Who is good in Physics, Dramatics and Computer Science ?

(1) Pratibha (2) Shivani

(3) Madhu (4) Asha

125. Who is good in Computer Science, History and Dramatics ?

(1) Asha (2) Madhu

(3) Namita (4) Shivani

***Directions : (Question Nos.* 126-130) :**

In these questions different alphabets stand for various symbols as indicated below :

Addition : O

Subtraction : M

Multiplication : A

Division : Q

Equal to : X

Greater than : Y

Less than : Z

Out of the four alternatives given in these questions, only one is correct according to the above letter symbols identify the correct answer.

126. (1) 3 O 2 X 2 Q 1 A 3 O 1 (2) 10 A 2 Y 2 Q 1 A 10 Q 2

(3) 10 A 2 Z 2 Q 2 A 10 Q 2 (4) 6 M 2 Y 10 Q 2 A 3 O 1

127. (1) 8 Y 2 A 3 A 4 Q 2 A 4 (2) 10 X 2 O 2 A 4 O 1 M 2

(3) 12 X 4 O 2 Q 1 A 4 A 2 (4) 2 Z 2 A 4 O 1 A 4 M 8

128. (1) 8 O 2 A 12 Q 10 X 18 Q 9 (2) 2 O 3 M 4 Q 2 Z 1 A 2

(3) 8 Q 4 A 1 M 2 X 16 M 16 (4) 6 Q 2 O 1 O 1 X 16 A 1

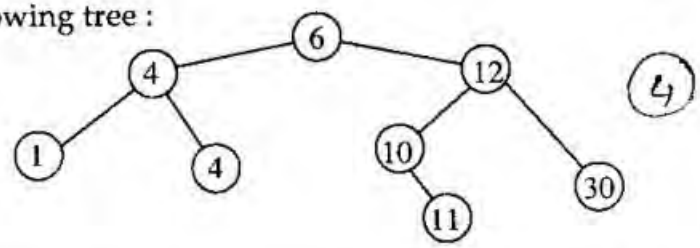
129. (1) 5 Q 5 A 5 O 5 Y 5 A 2 (2) 2 Q 1 O 10 A 1 Z 6 A 4
(3) 1 O 1 Q 1 M 1 Y 3 Q 1 (4) 3 O 2 O 10 Q 2 X 10 Y 2

130. (1) 2 Y 1 A 1 Q 1 O 1 A 1 (2) 16 Z 8 A 3 O 1 A 2 M 2
(3) 32 X 8 Q 2 A 3 Q 1 A 2 (4) 14 X 2 A 4 A 2 M 2 Q 1

131. A C. P. U. consist of :
(1) input unit
(2) output unit
(3) memory unit
(4) arithmetic and logical unit, control unit

132. The heart and the nerve centre of a computer is its :
(1) output unit (2) input unit (3) C. P. U. (4) memory

133. Consider the following tree :



If this tree is used for sorting, then a new number 8 should be placed at the :
(1) left child of node labelled 30 (2) right child of node labelled 5
(3) right child of node labelled 30 (4) left child of node labelled 10

134. In the Boolean Algebra the value of $x + x.(y + 1)$ is equal to :
(1) x (2) y (3) 1 (4) 0

135. C was primarily developed as a :
(1) systems programming language (2) general purpose language
(3) data processing language (4) machine language

136. C is a :

(1) high level language

(2) low level language

(3) high level language with some low level features

(4) machine language

137. The minimum number of temporary variables needed to swap the contents of two variables is :

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

138. Length of the string "Correct" is :

(1) 7 (2) 8

(3) 6 (4) implementation dependent

139. If integer needs two bytes of storage, then maximum value of a signed integer is :

(1) $2^{16}-1$ (2) $2^{15}-1$ (3) 2^{16} (4) 2^{15}

140. Consider the following program fragment

```
char c = 'a' ;
while (c++ < = 'z')
    putchar (xxx);
```

If the required output is abcd ..... xyz, then xxx should be :

(1) c (2) c (3) c-1 (4) --c

141. Deficiency of which of the following vitamins causes 'Ricket' ?

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

142. The New Year Day of the Indian Solar Calendar falls on which of the following dates ?

(1) January 1 (2) January 14 (3) March 21/22 (4) April 13/14

143. In which of the following countries did the decimal system of numbers originate ?

(1) India (2) England (3) France (4) Germany

144. Which of the following industries makes use of animal produced raw material ?

(1) Cotton textile mills (2) Jute mills

(3) Silk mills (4) Rayon mills

145. The Arjuna Awards are given for proficiency in which of the following ?

(1) Warfare (2) Mountaineering

(3) Journalism (4) Sports

146. Write down the correct answer in the given questions ?

(1) Dog is a faithful animal (2) The dog is a faithful animal

(3) The dog are a faithful animal (4) The dogs are a faithful animal

Directions : (Question Nos.* 147 and 148*) : In the following questions, choose the word, which is most nearly the same in meaning to the bold word and mark it in the Answer Sheet.

147. The device which **measures** earth-quakes is called the Richter Scale ?

(1) calculates (2) gauges (3) weights (4) prevents

148. The group is quite **heterogeneous** some are very rich while some are very poor.

(1) uniform (2) confusing (3) varied (4) contradictory

Directions : (Question Nos.* 149 and 150*) : In the following questions, choose the word, which is most nearly OPPOSITE in the meaning to the bold word and mark it in the Answer Sheet.

149. His bearing at his father's funeral lacked **gravity**.

(1) humility (2) levity (3) joy (4) seriousness

150. Worldly-wise people find it prudent to adopt a morally **flexible** attitude towards current behaviour patterns.

(1) weak (2) uncompromising

(3) hostile (4) neutral