MaaRula MCA Entrance Classes

AMIT KATIYAR (MCA-JNU) 117/0/687 In front of Anurag hospital, Crossing no. 9 Kanpur
E-mail ID- amitkatiyar.jnu08@gmail.com Cont. No. 9554548576, 8299331570
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BHU-2011 **Duration- (2 Hour)**

1. The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2-(4+\sqrt{5})x+8+2\sqrt{5}=0$ is :
(a) 2 (b) 4 (c) 6 (d) 8
2. The number of quadratic equations which remains unchanged by squaring their roots, is :
(a) Zero (b) Four (c) Two (d) Infinite
3. The nth term of the serried $2\frac{1}{2}+1\frac{7}{13}+1\frac{1}{9}+\frac{20}{23}+\ldots\ldots\ldots\ldots$ Is
(a) $\frac{20}{5n+3}$ (b) $\frac{2}{5n-3}$ (c) 20 (5n + 3) (d) $\frac{20}{5n^2+3}$
4. The coefficient of x^{15} the product $(x-1)(2x-1)(2^2x-1)\ldots(2^{15}x-1)$ is equal to :
(a) $2^{120}-2^{108}$ (b) $2^{105}-2^{121}$
(c) $2^{120}-2^{105}$ (d) $2^{120}-2^{104}$
5. The value of $\sum_{p=1}^{6}2\left(\sin\frac{2p\pi}{7}-i\cos\frac{2p\pi}{7}\right)$ is :
(a) 1 (b) 2 (c) $2i$ (d) $-2i$
6. If $1,\omega,\omega^2,\ldots,\omega^{n-1}$ are nth roots of unity, then $(1-\omega)(1-\omega^2)\ldots(1-\omega^{n-1})$ is equal to :
(a) n^2 (b) 0 (c) 1 (d) n
7. The number of subsets of a set containing n distinct object is
(a) ${}^nC_1+{}^nC_2+{}^nC_3+{}^nC_4+\ldots\ldots\ldots+{}^nC_n$
(b) 2^n-1
(c) 2^n+1
(d) ${}^nC_0+{}^nC_1+{}^nC_2+\ldots\ldots\ldots+{}^nC_n$
8. There are n numbered seats around a round table. Total number of ways in which $n_1(n_1<n)$ persons can sit around the round table, is equal to :
(a) ${}^nC_{n1}$ (b) ${}^nP_{n1}$ (c) ${}^nC_{n1-1}$ (d) ${}^nP_{n1-1}$
9. If the coefficient of x^7 in the expansion of $\left(px^2+\frac{1}{qx}\right)^{11}$ is equal to the coefficient of x^{-7} in the expansion of $\left(px-\frac{1}{qx^2}\right)^{11}$, then
(a) $pq=1$ (b) $\frac{p}{q}=1$ (c) $p+q=1$ (d) $p-q=1$
10. In the binomial expansion of $(a-b)^n, n\geq 5$, the sum of the 5th and 6th terms is zero. Then a/b equals :
(a) $\frac{n-4}{5}$ (b) $\frac{n-5}{6}$ (c) $\frac{5}{n-4}$ (d) $\frac{6}{n-5}$
11. If $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix}=0$, where x, y, z are unequal and non-zero real numbers, then xyz is equal to
(a) 1 (b) 2 (c) −1 (d) −2
12. If $A=\begin{bmatrix}1&1&1\\3&3&3\end{bmatrix}, B=\begin{bmatrix}-2&3\\1&-5\\4&1\end{bmatrix}$, then AB is equal to :
(a) $\begin{bmatrix}-3&-1\\-9&-3\end{bmatrix}$ (b) $\begin{bmatrix}3&-1\\9&-3\end{bmatrix}$ (c) $\begin{bmatrix}-3&1\\9&3\end{bmatrix}$ (d) $\begin{bmatrix}3&1\\-9&3\end{bmatrix}$
13. If $A=\begin{bmatrix}1&-2&-3\\2&1&-2\\3&2&1\end{bmatrix}$, then A is :
(a) Symmetric matrix (b) A skew symmetric matrix
(c) A singular matrix (d) Non-singular matrix
14. If $x=\frac{1}{2}(\sqrt{3}+1)$, then the value of expression $4x^3+2x^2-8x+7$ equal to :
(a) 10 (b) 5 (c) 0 (d) -2
15. If the ratio of the sum of m terms and n terms of an A.P. be $m^2:n^2$, then its ratio of its m^{th} and n^{th} terms will be :
(a) $\frac{m-n}{m+n}$ (b) $\frac{2m-1}{2n+1}$ (c) $\frac{2m+1}{2n+1}$ (d) $\frac{m+n}{m-n}$
16. If in a G.P. sum of n terms is 255, the last term is 128 and the common ratio is 2, then the value of n is equal to :
(a) 2 (b) 4 (c) 8 (d) 16
17. The value of $7\log\frac{16}{15}+5\log\frac{25}{24}+3\log\frac{81}{80}$ is equal to :
(a) 0 (b) log2 (c) log3 (d) log5
18. If $A=\{a,b,d,l\}, B=\{c,d,f,m\}$ and $C=\{a,l,m,o\}$, then $C\cap(A\cup B)$ is given by :
(a) $\{a,d,l,m\}$ (b) $\{b,c,f,o\}$
(c) $\{a,l,m\}$ (d) $\{a,b,c,d,f,l,m,o\}$
19. The number of subsets of an n elementic set is :
(a) $2n$ (b) n (c) 2^n (d) $\frac{1}{2}2^n$
20. If $A=\{1,2,3\}, B=\{4,5,6\}$, which of the following are relations from A to B ?
(a) $\{(1,5),(2,6),(3,4),(3,6)\}$
(b) $\{(1,6),(3,4),(5,2)\}$
(c) $\{(4,2),(4,3),(5,1)\}$
(d) $B\times A$
21. If $f=\{(1,1),(2,3),(0,-1),(-1,-3)\}$ be a function described by the formula $f(x)=ax+b$ for some integers a, b then the value of a, b is :
(a) $a=-1, b=3$ (b) $a=3, b=1$
(c) $a=-1, b=2$ (d) $a=2, b=-1$
22. A straight line passes through the point $P(2,\sqrt{3})$ and makes an angle of 60° with the x-axis. The length of the intercept on it between the point P and the line $x+\sqrt{3}y=12$
(a) 1.5 (b) 2.5 (c) 3.5 (d) 4.5
23. The coordinates of the orthocenter of the triangle formed by the lines $2x^2-2y^2+3xy+3x+y+1=0$ and $3x+2y+1=0$ are :
(a) (4/5, 3/5) (b) (-3/5, -1/5)
(c) (1/5, 4/5) (d) (2/5, 1/5)
24. The equation $\sqrt{(x^2+4y^2-4xy+4)}+x-2y=1$ represents a
(a) straight line (b) circle
(c) Parabola (d) Pair of straight line
25. Two circles $x^2+y^2=5$ and $x^2+y^2-6x+8=0$ are given. Then the equation of the circle through their point of intersection and the point (1, 1) is :
(a) $x^2+y^2-6x+4=0$ (b) $x^2+y^2-3x+1=0$
(c) $x^2+y^2-4x+2=0$ (d) $x^2+y^2-5x+3=0$
26. An equilateral triangle is inscribed in the parabola $y^2=4ax$ whose vertex is at the vertex of the parabola. The length of its side is :
(a) $a\sqrt{3}$ (b) $2a\sqrt{3}$ (c) $4a\sqrt{3}$ (d) $8a\sqrt{3}$
27. If in ellipse the length of latus rectum is equal to half of major axis, then eccentricity of the ellipse is
(a) $\sqrt{3}/2$ (b) 1/2 (c) $\sqrt{2}$ (d) $1/\sqrt{3}$
28. The difference of the focal distances of any point on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is :
(a) a (b) 2a (c) b (d) 2b
29. Every homogenous equation of second degree in x and y represent pair of lines
(a) parallel to x-axis (b) perpendicular to y-axis
(c) through the origin (d) parallel to y-axes
30. The value of $\lim_{x\to-2}\frac{\tan\pi x}{x+2}+\lim_{x\to\infty}\left(1+\frac{1}{x^2}\right)^x$ is equal to
(a) $\pi+1$ (b) $\pi-1$ (c) π (d) 3
31. If $f(x)=\begin{cases}0 & at\ \ x=0\\ \frac{1}{2}-x+[x] & if\ \ 0<x<\frac{1}{2}\\ \frac{1}{2} & if\ \ x=\frac{1}{2}\\ \frac{2}{3}-x & if\ \ \frac{1}{2}<x<1\\ 1 & if\ \ x=1\end{cases}$
Then $f(x)$ is :
(a) Continuous at $x=1/2$ (b) Continuous at $x=1$
(c) continuous at $x=0$ (d) Discontinuous at $x=0$
32. The derivative of $\sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ w.r.t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is :
(a) −1 (b) 0 (c) $1/x$ (d) x
33. The differential coefficient of x^x is :
(a) $x^x\log x$ (b) $x^x\left(\log x+\frac{1}{x}\right)$ (c) $x^x(\log x+1)$ (d) xx^{x-1}
34. The straight line $\frac{x}{a}+\frac{y}{b}=1$ touches the curve $y=b\,e^{-x/a}$ at the point
(a) where it crosses the y-axis
(b) where it crosses the x-axis
(c) (0, 0)
(d) (1, 1)
35. The equation of tangent to the curve $y^2=2x^3-x^2+3$ at the point (1, 4) is
(a) $y=2x$ (b) $x=2y$ (c) $y=4x$ (d) $x=4y$
36. The length of the normal at the point (2, 4) to the parabola $y^2=8x$ is :
(a) $4\sqrt{2}$ (b) 4 (c) $\sqrt{6}$ (d) $2\sqrt{3}$
37. 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
(a) Passes through the origin
(b) Makes a constant angle with the x-axis
(c) Makes a constant angle with the y-axis
(d) Is at constant distance from the origin
38. The function $f(x)=\sin x(1+\cos x)$ has a maximum value when
(a) $x=\frac{1}{2}\pi$ (b) $\frac{1}{3}\pi$ (c) $\frac{1}{4}\pi$ (d) $\frac{1}{5}\pi$
39. The function $f(x)=8x^5-15x^4+10x^2$ has no extreme value at
(a) $x=-\frac{1}{2}$ (b) $x=\frac{1}{2}$ (c) $x=1$ (d) $x=-1$
40. The value of $\int\log x\,dx$ is :
(a) $x(\log x+1)$ (b) $x(\log x-1)$
(c) $\log x(x+\log x)$ (d) $x(x-\log x)$
41. The value of $\int\frac{\tan^{-1}x}{1+x^2}dx$ is :
(a) $e^{\tan^{-1}x}$ (b) $e^{-\tan^{-1}x}$ (c) $\frac{1}{1+x^2}$ (d) $-\frac{1}{1+x^2}$
42. The value of $\int\frac{x-1}{(x-2)(x-3)}dx$ is
(a) $2\log(x-2)+\log(x-3)$
(b) $\log(x-2)-\log(x-3)$
(c) $\log(x-2)-\log(x-3)$
(d) $-\log(x-2)+2\log(x-3)$
43. The value of $\int_0^{\pi/4}\frac{\sin\theta+\cos\theta}{9+16\sin2\theta}d\theta$ is :
(a) $\frac{1}{10}\log2$ (b) $\frac{1}{20}\log5$ (c) $\frac{1}{20}\log3$ (d) $\frac{1}{30}\log7$
44. The volume of a right circular cylinder of height h and radius of base r is :
(a) $\frac{1}{3}\pi r^2$ (b) πr^2h (c) $\frac{4}{3}\pi r^2h$ (d) $\frac{1}{2}\pi r^2h$

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45. If l denoted slant height, r_1 and r_2 denote the radii of the frustum of cone, then curved surface of cone is :
(a) $\pi l(r_1 + r_2)$ (b) $\frac{1}{2}\pi l(r_1 - r_2)$
(c) $\pi r_1 r_2[l + (l^2 - r_1 r_2)]$ (d) $\pi r_1 r_2[l + (l^2 + r_1 r_2)]$

46. The degree of the differential equation
$\left[3 + 4\left(\frac{dy}{dx}\right) + 5\left(\frac{d^2y}{dx^2}\right)\right]^{2/3} = \left(\frac{d^3y}{dx^3}\right)^2$ is :
(a) 3 (b) 4 (c) 5 (d) 6

47. The particular integral of the differential equation
$(D^2 - 2D + 1)y = xe^x \sin x$ is given by :
(a) $e^x \sin(x + 1)$ (b) $x(e^x \cos + \sin x)$
(c) $e^x(x \cos x + \sin x)$ (d) $-e^x(x \sin x + 2\cos x)$

48. The value of $\frac{1}{(D-3)(D-2)}e^{2x}$ is :
(a) xe^{2x} (b) $2xe^{2x}$ (c) $-xe^{2x}$ (d) $-2xe^{2x}$

49. Solution of the differential equation
$(1 + y^2)dx + \left(x - e^{-\tan^{-1}y}\right)dy = 0$ is :
(a) $ye^{\tan^{-1}x} = \tan^{-1}x + c$
(b) $xe^{\tan^{-1}y} = \tan^{-1}y + c$
(c) $y = \tan^{-1}xe^{\tan^{-1}x} + c$
(d) $y = xe^{-\tan^{-1}x} + c$

50. Let the vectors $\vec{a}, \vec{b}, \vec{c}$ be the position vectors of the vertices P, Q, R of a triangle respectively which of the following represents the area of the triangle ?
(a) $\frac{1}{2}|\vec{a} \times \vec{b}|$ (b) $\frac{1}{2}|\vec{b} \times \vec{c}|$
(c) $\frac{1}{2}|\vec{c} \times \vec{a}|$ (d) $\frac{1}{2}|\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}|$

51. If $\vec{a}$ and $\vec{b}$ represent two adjacent sides $\overrightarrow{AB}$ and $\overrightarrow{BC}$ respectively of a parallelogram ABCD, then its diagonals $\overrightarrow{AC}$ and $\overrightarrow{DB}$ are equal to :
(a) $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ (b) $\vec{a} - \vec{b}$ and $\vec{a} + \vec{b}$
(c) $\vec{a} + 2\vec{b}$ and $\vec{a} - 2\vec{b}$ (d) $2\vec{a} + \vec{b}$ and $2\vec{a} - \vec{b}$

52. Let $ABCD$ be a parallelogram. If $\vec{a}, \vec{b}, \vec{c}$ be the position vectors of A, B, C respectively with reference to the origin O, then the position vector of D with reference to O is :
(a) $\vec{a} + \vec{b} + \vec{c}$ (b) $\vec{b} + \vec{c} - \vec{a}$
(c) $\vec{c} + \vec{a} - \vec{b}$ (d) $\vec{a} + \vec{b} - \vec{c}$

53. If two vectors $\vec{a}$ and $\vec{b}$ are parallel and have equal magnitudes, then
(a) They are not equal
(b) They may or may not be equal
(c) They have the same sense of direction
(d) They do not have the same direction

54. If $\vec{a}$ and $\vec{b}$ are two unit vectors and θ is the angle between them. Then $\vec{a} + \vec{b}$ is unit vector if
(a) $\theta = \frac{\pi}{3}$ (b) $\theta = \frac{\pi}{4}$ (c) $\theta = \frac{\pi}{2}$ (d) $\theta = \frac{2\pi}{3}$

55. If the position vectors of A and B are $\theta = \vec{a}$ and $\vec{b}$ respectively, then the position vector of a point P which divides AB in the ratio 1:2 is :
(a) $\frac{\vec{a}+\vec{b}}{3}$ (b) $\frac{\vec{b}+2\vec{a}}{3}$ (c) $\frac{\vec{a}+2\vec{b}}{3}$ (d) $\frac{\vec{b}-2\vec{a}}{3}$

56. Point A is $\vec{a} + 2\vec{b}$, P is $\vec{a}$ and P divides AB in the ratio 2 : 3. The position vector of B is :
(a) $2\vec{a} - \vec{b}$ (b) $\vec{b} - 2\vec{a}$ (c) $\vec{a} - 3\vec{b}$ (d) $\vec{b}$

57. $\vec{a}.\vec{b}$ implies only
(a) $\vec{a} = 0$
(b) $\vec{b} = 0$
(c) $\theta = 90°$
(d) either $\vec{a} = 0$ or $\vec{b} = 0$ or $\theta = 90°$

58. If θ be the angle between the vectors $4(\hat{\imath} - \hat{k})$ and $\hat{\imath} + \hat{\jmath} + \hat{k}$, then θ is :
(a) $\pi/2$ (b) $\pi/3$ (c) $\pi/4$ (d) $\cos^{-1}(1/\sqrt{3})$

59. If $[\vec{a}, \vec{b}, \vec{c}]$ is a scalar triple product of three vectors $\vec{a}, \vec{b}$, and $\vec{c}$ then $[\vec{a}\ \vec{b}\ \vec{c}]$ is equal to :
(a) $[\vec{b}\ \vec{a}\ \vec{c}]$ (b) $\vec{c}\ \vec{b}\ \vec{a}$ (c) $\vec{b}\ \vec{c}\ \vec{a}$ (d) $\vec{a}\ \vec{c}\ \vec{b}$

60. If θ is the angle between vectors $\vec{a}$ and $\vec{b}$, then $|\vec{a} \times \vec{b}| = |\vec{a}.\vec{b}|$ when θ is equal to :
(a) 0 (b) 45° (c) 135° (d) 180°

61. If $\vec{a} = 4\hat{\imath} + 2\hat{\jmath} - 5\hat{k}$, $\vec{b} = -12\hat{\imath} - 6\hat{\jmath} + 15\hat{k}$, then the vectors $\vec{a}$, $\vec{b}$ are
(a) Parallel (b) Non-parallel
(c) Orthogonal (d) Non-Orthogonal

62. If the position vector of three points are
$\vec{a} - 2\vec{b} + 3\vec{c}$, $2\vec{a} + 3\vec{b} - 4\vec{c}$, $7\vec{b} + 10\vec{c}$
Then the three points are
(a) Collinear (b) Coplanar
(c) Non-coplanar (d) Neither

63. If $\vec{A} = 2\hat{\imath} + 2\hat{\jmath} - \hat{k}$, $\vec{B} = 6\hat{\imath} - 3\hat{\jmath} + 2\hat{k}$, then $\vec{A} \times \vec{B}$ will be given by
(a) $2\hat{\imath} - 2\hat{\jmath} - \hat{k}$ (b) $6\hat{\imath} - 3\hat{\jmath} + 2\hat{k}$
(c) $\hat{\imath} - 10\hat{\jmath} - 18\hat{k}$ (d) $\hat{\imath} + \hat{\jmath} + \hat{k}$

64. If $|\vec{a}| = |\vec{b}|$, then $(\vec{a} + \vec{b}).(\vec{a} - \vec{b})$ is :
(a) Positive (b) Negative
(c) unity (d) zero

65. The vector $2\hat{\imath} + \hat{\jmath} - \hat{k}$ is perpendicular to $\hat{\imath} - 4\hat{\jmath} + \tau\hat{k}$ if τ is equal to :
(a) 0 (b) −1 (c) −2 (d) −3

66. The value of $\cos 10° - \sin 10°$ is :
(a) Positive (b) Negative (c) 0 (d) 1

67. If $\sin\alpha = \sin\beta$, then the angle α and β are related by
(a) $\alpha = 2n\pi + (-1)^n\beta$ (b) $\alpha = n\pi \pm \alpha$
(c) $\beta = n\pi + (-1)^n\alpha$ (d) $\beta = (2n + 1)\pi + \alpha$

68. The value of $\frac{1-\tan^2 15°}{1+\tan^2 15°}$ is :
(a) $\sqrt{3}$ (b) $\sqrt{3}/2$ (c) 1 (d) 2

69. The general solution of the trigonometrical equation $\sin x + \cos x = 1$ is given by :
(a) $x = 2n\pi, n = 0, \pm1, \pm2, \ldots\ldots$
(b) $x = 2n\pi + \frac{\pi}{2}, n = 0, \pm1, \pm2, \ldots\ldots$
(c) $x = n\pi + (-1)^n\frac{\pi}{4} - \frac{\pi}{4}, n = 0, \pm1, \pm2, \ldots\ldots$
(d) $x = n\pi + (-1)^n\frac{\pi}{4}, n = 0, \pm1, \pm2, \ldots\ldots$

70. From the top of a light house 60 metrs high with its base at the sea-level, the angle of depression of a boat is 16°. The distance of the boat from the foot of the light house is :
(a) $\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)60\ meters$ (b) $\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)60\ meters$
(c) $\frac{\sqrt{3}+1}{\sqrt{3}-1}\ meters$ (d) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ meters

71. If $\sin\alpha = -\frac{3}{2}\left(\pi < \alpha < \frac{3}{2}\pi\right)$, then the value of $\cos\frac{1}{2}\alpha$ is :
(a) $-\frac{1}{\sqrt{10}}$ (b) $\frac{1}{\sqrt{10}}$ (c) $\frac{3}{\sqrt{10}}$ (d) $\frac{7}{\sqrt{10}}$

72. The value of $\tan 9° - \tan 27° - \tan 63° + \tan 81°$ is
(a) 1 (b) 2 (c) 3 (d) 4

73. In a ΔABC,
$$cosec\ A(\sin B \cos C + \cos B \sin C)$$
Equals :
(a) c/a (b) a/c (c) 1 (d) 0

74. Three coins are thrown together. The probability of getting two or more head is :
(a) 1/4 (b) 1/2 (c) 2/3 (d) 3/8

75. The average of n numbers $x_1, x_2, x_3, \ldots\ldots, x_n$ is A. if is replaced by (-1), then the new average is :
(a) $\frac{(-1)+}{}$ (b) $\frac{+(+1)}{}$
(c) $\frac{(+1)+}{}$ (d) +

76. For a frequency distribution standard deviation is computed by using the formula
(a) $= \frac{\sum(-)}{\sum}$ (b) $= \frac{\sqrt{\sum(-)^2}}{\sum}$
(c) $= \sqrt{\frac{\sum(-)^2}{\sum}}$ (d) $= \sqrt{\frac{\sum(-)}{\sum}}$

77. Which one of the following statement is true for a given distribution ?
(a) Mean deviation > Standard deviation
(b) Mean deviation < Standard deviation
(c) Mean deviation = Standard deviation
(d Mean deviation and Standard deviation are not related

78. In case of binomial distribution, probability of r successes is given by
(a) ${}^nC_r q^{n-r} p^r$ (b) ${}^nC_r p^{n-r} q^r$
(c) ${}^nC_r p^{n-r}$ (d) ${}^nC_r q^{n-r}$

79. The standard deviation for Poisson distribution with parameter m is :
(a) (b) $\sqrt{}$ (c) $1/$ (d) $1/\sqrt{m}$

80. For a normal distribution, we have
(a) Mean = median (b) median = mode
(c) mode = mean (d) mean = median = mode

81. The value of the correlation coefficient between two variables lies between
(a) 0 and ∞ (b) $-\infty$ and $+\infty$
(c) 0 and 1 (d) -1 and 1

82. Crown : Royal
(a) Throne : Regal (b) Wrap : Earmine
(c) Pen : Author (d) Crucifix : Religion

83. In simple method, when the number of non-zero variables is equal to the number of constraints, the set of values js said to form a
(a) Feasible solution (b) Basic solution
(c) Iso-cost solution (d) Optimal solution

84. The linear programming problem :
Maximize $z = 4x + y$
Subject to $3x + 5y \le 15$,
$5x + y \le 15$,
$-x + y \le 2$,
$4x + 5y \le 20$,
$x, y \ge 0$
has :
(a) No solution (b) One solution
(c) Infinite solution (d) Finite solution

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85. The resultant of two forces P, Q acting at a certain angle is X; and that of P, R acting at the same angle is also X. then the value of P is
(a) $\sqrt{Q^2 + RX}$ (b) $\sqrt{R^2 + QX}$
(c) $\sqrt{X^2 + QR}$ (d) $\sqrt{QR(Q + R)}$

86. ABCDE is a pentagon. Forces acting on a particle are represented in magnitude and direction by $\overrightarrow{AB}, \overrightarrow{BC}, \overrightarrow{CD}, 2\overrightarrow{DE}, \overrightarrow{AD}$ and $\overrightarrow{AE}$. Their resultant is given by
(a) $\overrightarrow{AE}$ (b) $2\overrightarrow{AE}$ (c) $3\overrightarrow{AE}$ (d) $4\overrightarrow{AE}$

87. Which one of the following is not a force ?
(a) Tension (b) Attraction (c) Weight (d) acceleration

88. 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, then the point of application of the resultant will be displaced through a distance (along AB)
(a) $\frac{P+Q}{P-Q}AB$ (b) $\frac{P-Q}{P+Q}AB$ (c) $(P-Q)AB$ (d) $(P+Q)AB$

89. A beam whose centre of gravity divides it into two portions, a and b is placed inside a smooth sphere. if θ be its inclination to the horizon in the position of equilibrium and 2α be the angle subtended by the beam at the centre of the sphere, then
(a) $\tan\theta = (b-a)(b+a)\tan\alpha$
(b) $\tan\theta = \frac{(b-a)}{(b+a)}\tan\alpha$
(c) $\tan\theta = \frac{(b+a)}{(b-a)}\tan\alpha$
(d) $\tan\theta = \frac{1}{(b-a)(b+a)}\tan\alpha$

90. P, Q, R are the points on the sides BC, CA, AB of triangle ABC such that BP : PC = CQ : QA = AR : RB = m : n. if Δ denote the area of the triangle ABC, then the forces $\overrightarrow{AP}, \overrightarrow{BQ}, \overrightarrow{CR}$ reduce to a couple whose moment is :
(a) $2\frac{m-n}{m+n}\Delta$ (b) $2\frac{m+n}{m-n}\Delta$
(c) $2(m^2-n^2)\Delta$ (d) $2(m^2+n^2)\Delta$

91. Two unlike parallel forces P and Q (P > Q), xm apart act at two points of a rigid body. If the direction of P be reversed, then the resultant is displaced through the distance
(a) $2PQ\,xm$ (b) $(P^2-Q^2)xm$
(c) $\frac{2PQ}{P^2-Q^2}xm$ (d) $\frac{2PQ}{P^2+Q^2}xm$

92. If the resultant of two forces P and Q acting at a point at an angle α is $(2m+1)\sqrt{P^2+Q^2}$ and when they act at an angle $\left(\frac{\pi}{2}-\alpha\right)$, the resultant becomes $(2m-1)\sqrt{P^2+Q^2}$, then
(a) $\tan\alpha = \frac{1}{m+1}$ (b) $\tan\alpha = \frac{1}{m-1}$
(c) $\tan\alpha = \frac{m+1}{m-1}$ (d) $\tan\alpha = \frac{m-1}{m+1}$

93. To a man walking at 2km/hr the rain appears to fall vertically when he increases his speed to 4km/hr it appears to meet him at an angle of 45°. Then the actual velocity of rain is :
(a) $\sqrt{2}\,km/hr$ (b) $\sqrt{3}\,km/hr$
(c) $2\sqrt{2}\,km/hr$ (d) $2\sqrt{3}\,km/hr$

94. Acceleration of a moving point is :
(a) A negative quantity (b) a vector quantity
(c) A single number (d) A positive number

95. If a body is falling freely under gravity, then the acceleration
(a) Is zero
(b) Is uniform
(c) Varies as the square of the distance travelled
(d) Varies as the inverse of the distance travelled

96. A point moves with uniform acceleration and v_1, v_2, v_3 denote the average velocities in three successive intervals of time t_1, t_2, t_3 then
(a) $\frac{v_1-v_2}{v_2-v_3} = \frac{t_1+t_2}{t_2+t_3}$ (b) $\frac{v_1+v_2}{v_2+v_3} = \frac{t_1+t_2}{t_2+t_3}$
(c) $\frac{v_1+v_2}{v_2+v_3} = \frac{t_1-t_2}{t_2-t_3}$ (d) $\frac{v_1-v_2}{v_2-v_3} = \frac{t_1-t_2}{t_2-t_3}$

97. A mass m is acted upon by a constant force P lb.w.t. under which in t sec it moves a distance of x feet and acquires a velocity v ft/sec. then x is equal to
(a) $\frac{gP}{2mt^2}$ (b) $\frac{mg}{2v^2P}$ (c) $\frac{gt^2}{2Pm}$ (d) $\frac{mv^2}{2gP}$

98. Masses of 5kg and 3 kg rest on two inclined planes each of 30° and are connected by a string passing over the common vertex. After 2 seconds the mass of 5kg is removed. How far up the plane will the 3kg mass continue to move ?
(a) $\frac{2}{3}m$ (b) $\frac{3}{5}m$ (c) $\frac{4}{7}m$ (d) $\frac{5}{8}m$

99. The time of flight of a particle, which is projected with velocity u in a direction making an angle α, is given by
(a) $2ug\sin\alpha$ (b) $2ug\cos\alpha$
(c) $\frac{2u\sin\alpha}{g}$ (d) $\frac{2u\cos\alpha}{g}$

100. If a particle is projected with a velocity u at an angle α = 45°, then
(a) the range is minimum
(b) the range is maximum
(c) the range is maximum and equals $\frac{u^2}{2g}$
(d) the time to the highest point is $\frac{u}{g\sqrt{2}}$

Directions (101 – 105) : Data on the candidates, who took an examination is Social Sciences, Mathematics and Science are given below :

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

Answer the following questions based on above data :

101. How many failed in one subjects only ?
(a) 56 (b) 61 (c) 144 (d) 152

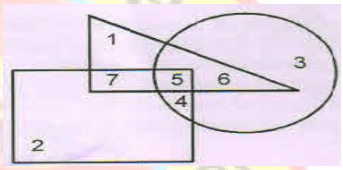
102. How many failed in two subjects only ?
(a) 56 (b) 61 (c) 144 (d) 162

103. How many failed in Social Sciences only ?
(a) 15 (b) 21 (c) 30 (d) 42

104. How many passed at least in one subject ?
(a) 167 (b) 304 (c) 390 (d) 450

105. How many passed in Mathematics and at least in one more subject ?
(a) 94 (b) 170 (c) 203 (d) 210

Directions (106 – 108) : These questions are based on the diagram given below. In the diagram, the triangle stands for graduates, squares for membership of professional organizations and the circle for membership of social organizations. Read each statement and find out the appropriate numbers to represent the people covered by statements :

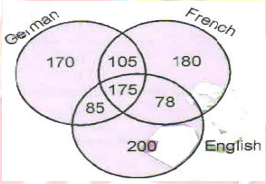


106. Number of graduates in social organizations is represented by
(a) 1 (b) 5 (c) 6 (d) 5 and 6

107. Number of graduates in social organizations is represented by
(a) 3 (b) 4 (c) 5 (d) 6

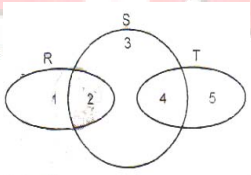
108. Number of graduates in professional organizations is represented by
(a) 5 and 7 (b) 4, 5 and 6
(c) 6 and 7 (d) 5, 6 and 7

109. 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 :



(a) 1/27 (b) 1/25 (c) 7/550 (d) 175/1000

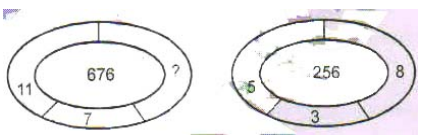
110. The following diagram, R represents businessmen, S represents rich men, T represents honest men. Which number will represent honest rich men ?



(a) 2 (b) 3 (c) 5 (d) 4

Directions (111 – 115) : Which number should come in place of question mark (?) in the following questions :

111.



(a) 8 (b) 7 (c) 6 (d) 4

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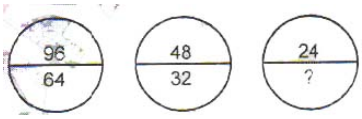
112.

1	7	9
2	14	?
3	105	117

(a) 12 (b) 26 (c) 16 (d) 20

113.

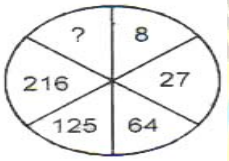


(a) 8 (b) 10 (c) 16 (d) 21

114.

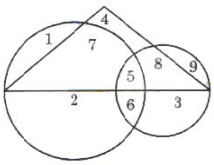
(a) 26 (b) 36 (c) 52 (d) 117

115.



(a) 729 (b) 343 (c) 305 (d) 4

Directions (116 – 120) : The following five 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 :



116. How many female graduates are self-employed ?
(a) 12 (b) 13 (c) 15 (d) 20

117. How many female graduates are not self-employed ?
(a) 4 (b) 10 (c) 12 (d) 15

118. How many non-graduate females are self-employed ?
(a) 9 (b) 11 (c) 12 (d) 21

119. How many self-employed female graduates are wigh bank loan facility ?
(a) 5 (b) 7 (c) 12 (d) 20

120. How many non-graduate self-employed females are with bank loan facility ?
(a) 3 (b) 8 (c) 9 (d) 12

121. If PERILOUS is written as TGTKNQWU in a code language then how will OLYMPIC be written in that language ?
(a) QNOAKRE (b) QONARKE
(c) QNAORKE (d) QNOARE

122. If 'MASTER' is written as '412536' and 'SERVANT' is written as '2367185' then how will 'REVERENT' be written in the same code language ?
(a) 6 3 7 3 6 3 8 5 (b) 3 6 7 3 3 6 8 5
(c) 8 5 3 3 6 5 3 8 (d) 6 3 5 3 6 3 8 5

123. If the code word for BOMBOY in a certain code is 58 then, what will be the code word for TROMBAY ?
(a) 89 (b) 94 (c) 95 (d)84

124. In a certain code language 'MTP' is coded as- 'I am happy'. 'CTR' as- 'That black happy' and 'NPS' as- 'I very happily'. Then which word is used for 'am' ?
(a) M (b) T (c) P (d) C

125. If CAT is code as TC then how will SUN be coded ?
(a) UN (b) NU (c) US (d) NS

126. In the following series, find the term in place of question mark (?)
3, 8, 27, 112, 565, ?
(a) 3400 (b) 3396 (c) 1596 (d) 2266

127. In the following number series one number is wrong. Find out the wrong number-d
9, 15, 22, 30, 40, 49, 60
(a) 15 (b) 30 (c) 40 (d) 49

128. In the following a missing term is to be find out (?)
$DKM, FJP, HIS, JHV, ?$
(a) HGY (b) IGZ (c) IGY (d) LGY

129. Letters of which of the alternative answers when placed at the blank places one after another will complete the given letter-series ?
$a\_bbc\_aab\_cca\_bbcc$
(a) acba (b) bacb (c) caba (d) abba

130. In the following question a number-series is given. Which one of the alternatives will replace the question mark (?) ?
(a) 169 (b) 159 (c) 119 (d) 139

131. The headquarters of the World Health Organization is located at :
(a) Paris (b) Geneva (c) Peru (d) Chicago

132. Who was the first Indian to be the President of U.N. General assembly ?
(a) Natwar Singh (b) Ramesh Bhandari
(c) Smt. Vijai Lakshmi Pandit (d) Pandit J.L. Nehru

133. Marketing of agricultural produce in India is through :
(a) Co-operatives (b) Businessmen
(c) Government (d) Individuals

134. The first railway line was laid in India in :
(a) 1836 (b) 1803 (c) 1853 (d) 1860

135. The Vikram Sarabhai space cnetre is located at
(a) Sriharikota (b) Trivandram
(c) Trombay (d) Bangalore

Directions (136 – 137) : 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.

136. His style is quite **transparent.**
(a) verbose (b) Involved (c) Lucid (d) Witty

137. **High**
(a) Tall (b) Short (c) Thin (d) Fat

Directions (138 – 139) : In the following questions, choose the word which is most nearly the OPPOSITE in meaning to the **bold** word and mark it in the Answer Sheet :

138. Lucy is a **smart** girl.
(a) Active Indecent Casual Lazy

139. **Day**
(a) Year (b) Month (c) Night (d) Hour

140. In the following questions, the first and the last part of the sentence are numbered 1 and 6. The rest of the sentence is split up into four pasts and named P, Q, R and S. these four parts are not given in their proper order. Read the sentence and find out which part of the four combinations is correct. Then find the correct answer and indicate it in the Answer Sheet :
1: Religion has been used
P: both as a weapon of isolation
Q: to dull awareness
R: about real problems
S: and as morphia
6: like education, health and employment
(a) PQRS (B) PSQR (C) QPSR (D) RPQS

141. THE HEART AND THE NERVE CENTRE OF A COMPUTER IS ITS
(a) Output unit (b) Input unit
(c) C.P.U. (d) Memory

142. Main memory unit of a computer
(a) Performs arithmetic
(b) Stores a small amount of data and instructions
(c) Stores bulk of data and instructions
(d) Supervises the working of all the unit

143. The modern digital computer uses
(a) Decimal system (b) Octal system
(c) Binary system (d) All of these

144. The base of the binary number system is
(a) 2 (b) 16 (c) 8 (d) 10

145. Ten data items are to be read in a problem. The control structure needed is
(a) Selection or repetition
(b) Only sequential
(c) Only selection
(d) Sequential or repetition

146. C is s
(a) High level language
(b) Low level language
(c) High level language with some low level features
(d) Machine language

147. Which of the following codes uses 7 bits to represent a character ?
(a) ASCII (b) BCD (c) EBCDIC (d) GRAY

148. The Boolean expression $X + X'Y$ equal :
(a) $X + Y$ (b) $X + XY$ (c) $Y + YX$ (d) $X'Y + Y'X$

149. Let A be a set having n element. The number of binary operations that can be defined on A is

(a) z^{n^n} (b) n^{n^z} (c) n^{z^n} (d) z^{z^n}

150. The Boolean expression

$$(A + C)(AB' + AC)(A'C' + B')$$

can be simplified to

(a) $AB + A'C$ (b) $A'B + BC$

(c) $AB + BC$ (d) AB