**UPMOCK**

**NOTE : In Actual UP Paper there will be 100 questions to be done in 2 hrs. But for giving more practice to the students, in this mock, we have 150 questions to be done in 2:30 hrs**.

## SECTION: A (Mathematics Statistics & Logical Ability)

**1.** Which one of the following is not a Peano's axiom for the set N of natural number?
(a) $\exists$ a natural number 1
(b) $\exists$ an injective mapping $\sigma : N \rightarrow N$.
If $n \in N$, then $\sigma$ (N) is called the successor of n
(c) $\sigma$ is an onto mapping
(d) if $K \subset N$ s.t. $1 \in K$ and $n \in K \Rightarrow \sigma(n) \in K$, then k=N.

**2.** The relation $\sim$ in $N \times N$, such that (a, b) & (c, d) iff $a + d = b + c$, is
(a) Neither symmetric nor transitive but objective.
(b) Reflexive and transitive but not symmetric.
(c) An equivalence relation
(d) none

**3.** If p and q are integers such that $p : q = 0$, then it is necessary that
(a) p = 0                    (b) q = 0
(c) other p = 0 or q = 0     (d) both p = 0 and q = 0

**4.** the angle of projection of a body for attaining maximum rage is
(a) 45°     (b) >45°     (c) <45°     (d) none

**5.** Angular velocity of the minutes hand of a watch is
(a) $\frac{\pi}{180}$ rad./sec.   (b) $\frac{\pi}{360}$ rad./sec.   (c) $\frac{\pi}{720}$ rad./sec.   (d) none of these

**6.** The relation R in $I \times I_0$ (where ( $I_0 = I - \{0\}$) such that (a, b) R (c, d) iff ad = bc is
(a) reflexive and symmetric       (b) reflexive but not symmetric
(c) equivalence relation          (d) none

**7.** $12 x \equiv 5 \pmod{16}$ has
(a) a unique solution       (b) two solution
(c) no solution             (d) none of these

**8.** Let A and B be two non empty subsets of R such that A is bounded above and B is bounded below then which of the following is false?
(a) $A \cap B$ is bdd.        (b) A-B is bdd. Above
(c) $A \cup B$ is bdd.        (d) B-A is bdd. Above

**9.** $\int_{-1}^{1} x |x| \, dx$ is
(a) 0        (b) 1        (c) 2        (d) none of these

**10.** Which of the following is true?
(a) A couple cannot be replaced by a single force
(b) If a number of coplanar forces acting at a point of a rigid body have a resultant, then the vector sum of the moments of all the forces about any arbitrary point is equal to the moment of the resultant about the point

(c) The resultant of two equal forces P and P acting at a point at an angle $\alpha$ is equal to 2P cos $\frac{\alpha}{2}$ and its direction bisects the angle between the force.
(d) all the above

**11.** Moment is a
(a) Signed number          (b) Positive number
(c) Negative number        (d) Vector quantity

**12.** Let X, Y, Z be the sum of the components of n forces $F_1, F_2 ...., F_n$ acting at a point, in three mutually perpendicular directions. Then the forces are in equilibrium if
(a) X = Y = Z= 0           (b) X +Y+Z= 0
(c) X =Y=Z                 (d) none of these

**13.** The minimum value of the function $3|x| + 4|x-1|$ is
(a) 3        (b) 4        (c) 7        (d) 1

**14.** If the line y=5x +1 touches the parabola $y^2 = 4rx$, then
(a) r=1      (b) r=3      (c) r=5      (d) r=25

**15.** The probability that an event A happens in one trail of an experiment is 0.4. Three independent trials of the experiment are performed. The probability that the event A happens atleast once is
(a) 0.936    (b) 0.784    (c) 0.904    (d) none

**16.** If y=x- $x^2 + x^3 - x^4 + ..... \infty$, the value of x is
(a) y - $\frac{1}{y}$     (b) y + $\frac{1}{y}$     (c) $\frac{y}{1+y}$     (d) $\frac{y}{1-y}$

**17.** If f(x) = cos (log x), then the value of f(x). f(y)- $\frac{1}{2}[f(y/x) + f(xy)] is$
(a) $\frac{1}{2}$     (b) –1     (c) +1     (d) 0

**18.** The probability of safe arrival of one ship cut of 5 is $\frac{1}{5}$. The probability of arrival of at least three ships is
(a) $\frac{1}{31}$     (b) $\frac{18}{312}$     (c) $\frac{181}{3125}$     (d) $\frac{184}{3125}$

**19.** The determinant of the Vander monde matrix is

$$\begin{bmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{bmatrix}$$

(a) abc                                (b) (a-b) (b-c)(c-a)
(c) ab(a-b)                            (d) none of these

**20.** The magnitude of the sum of vectors
$\vec{i} + \vec{j} + \vec{k}, \quad \vec{i} - \vec{j} - \vec{k}, -\vec{i} + \vec{j} - \vec{k} \quad and \quad -\vec{i} - \vec{j} + \vec{k} \quad is$

(a) $\sqrt{3}$          (b) $\sqrt{2}$          (c) 1          (d) 0

**21.** For the distribution in which the values of x are 1, 2, 3……., *n* the frequency of each being unity, the variances is:

(a) $\frac{1}{12}(n^2 - 1)$              (b) $\frac{1}{12}(n^2 + 1)$

(c) $\frac{1}{6}(n+1)(2n+1)$          (d) $\frac{1}{2}(n+1)$

**22.** Maximum value of $\left(\frac{1}{x}\right)^x$ is :

(a) $(e)^{1/e}$          (b) $\left(\frac{1}{e}\right)^e$          (c) e          (d) $\frac{1}{e}$

**23.** If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}| = 4, |\vec{b}| = 3$ and $\vec{a}.\vec{b} = 6$,

then the angle between $\vec{a}$ and $\vec{b}$ is
(a) 90°          (b) 30°          (c) 60°          (d) 45°

**24.** $1 + \frac{1+2}{2!} + \frac{1+2+2^2}{3!} + \frac{1+2+2^2+2^3}{4!} + ....$

(a) $e^2$          (b) $e$          (c) $e^2 - e$          (d) none

**25.** Which of the following statement is false:
(a) A triangle formed in a circle with one of its sides as the diameter of the circle will be right angled triangle
(b) There is always a real root for any quadratic equation
(c) The number of ways of seating two persons in two chairs out of *n* person will be $^nP_2$.
(d) There is only one triangle (apart from the triangles congruent to it) with Prescribed length for side a, b, c, with a < (b+c).

**26.** If y= $\tan^{-1}\left[\frac{\sqrt{1+x^2}-1}{x}\right]$ and $\theta = \tan^{-1} x$. Then $\frac{dy}{d\theta}$ is

(a) $\frac{x}{2}$          (b) $\frac{1}{2}$          (c) $-\frac{1}{2}$          (d) none of these

**27.** In the expansion of $\left(x^3 - \frac{1}{x^2}\right)^{15}$ than constant term is:

(a) 0          (b) $^{15}C_6$          (c) $-^{15}C_6$          (d) 1

**28.** If $x \neq y \neq z$ and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0,$

then
(a) x + y + z=1          (b) x +y+ z= - 1          (c) xyz=1          (d) xyz=-1

**29.** In a binomial distribution the mean is 4 and variance 3, then its mode is
(a) 4          (b) 5          (c) 6          (d) none of these

**30.** When the correlation coefficient r= $\pm 1$, then the two regression lines:
(a) are perpendicular          (b) coincide
(c) are parallel to each other          (d) do not exist

**31.** How many balanced coins should be tossed for getting probability of two head at least 0.99?
(a) 9          (b) 10          (c) 11          (d) 12

**32.** The points (a, b+c ), (b, c +a), (c, a +b)
(a) form a right angled triangle          (b) form an equilateral triangle
(c) are collinear          (d) none of these

**33.** If the equation $ax^2 + 2hxy + b y^2 + 2gx + 2fy + c=0$ represents two straight lines at right angles to each other then the product of the length of the perpendicular from the origin to these lines is

(a) $\frac{c}{\sqrt{h^2 - ab}}$          (b) $\frac{2c}{\sqrt{h^2 - ab}}$

(c) $\frac{c}{2\sqrt{h^2 - ab}}$          (d) none of these

**34.** The eccentricity of an ellipse whose latus rectum equals the semi minor axis is

(a) $\frac{1}{2}$          (b) $\frac{1}{3}$          (c) $\frac{\sqrt{3}}{2}$          (d) $\frac{1}{\sqrt{2}}$

**35.** If the sum of the inclinations to the x-axis of any two tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is 90°, then the locus of their points of intersection is $x^2 + ky^2 = a^2 + lb^2$ where k and *l* respectively are
(a) 1, 1          (b) −1, -1          (c) 1, -1          (d) −1, 1

**36.** The value of $\frac{15}{\sqrt{10} + \sqrt{20} + \sqrt{40} - \sqrt{5} - \sqrt{80}}$ is

(a) $\sqrt{5}(2+\sqrt{2})$          (b) $\sqrt{5}(5+\sqrt{2})$

(c) $\sqrt{5}(1+\sqrt{2})$          (d) none of these

**37.** Let A be a set containing 20 distinct elements, then total number of distinct function from A to A is
(a) 20!          (b) $2^{20}$          (c) $20^{20}$          (d) none of these

**38.** If [x] denotes the greatest integer function then the value of

$\int_{0.5}^{4.5}[x] \, dx + \int_{-1}^{1}|x| \, dx$ is

(a) 3          (b) 6          (c) 9          (d) none of these

**39.** The sum of n terms of the series
$\cot^{-1}3 + \cot^{-1}7 + \cot^{-1}13 + ....is$

(a) $\tan^{-1}\frac{n}{n+2}$          (b) $\tan^{-1}n^2$

(c) $\tan^{-1}\frac{n+2}{n}$          (d) $\tan^{-1}\frac{1}{n^2}$

**40.** Four dice are rolled. The number of possible outcomes in which atleast one dice shows 2 is
(a) 625          (b) 671          (c) 1296          (d) none of these

**41.** $\underset{x \to 1}{Lim} \frac{\sqrt{1 - \cos 2(x-1)}}{x-1}$

(a) is equal to $\sqrt{2}$          (b) is equal to $-\sqrt{2}$
(c) does not exist          (d) none of these

**42.** If $x > 1$, $y > 1$, $z > 1$ are in G.P.. then

$$\frac{1}{1+\log x}, \frac{1}{1+\log y}, \ldots\ldots\ldots\ldots, \frac{1}{1+\log z} \text{ are in}$$

(a) A.P.       (b) G.P.       (c) H.P.       (d) none

**43.** The area of the surface of frustum of a cone, where $r_1$, $r_2$ be the radii of two circular bases and $l$ be the slant height of the frustum be

(a) $\pi l(r_1 + r_2)$     (b) $\pi l r_1 r$     (c) $\pi r_1 r_2$     (d) none

**44.** The focus of the parabola $2(x^2 + y^2) = (x + y - 1)^2$ is

(a) $(1, 0)$     (b) $(0, 1)$     (c) $(0, 0)$     (d) $(1, 1)$

**45.** In (In sinx) is a real valued function of x for (In is natural log)
(a) all real values of x
(b) all values of $x > 0$
(c) all real values of x lying between 0 and 1
(d) for no real value of x

**46.** The value of $({}^n C_0)^2 + ({}^n C_1)^2 + \ldots + ({}^n C_n)^2$ is

(a) $\dfrac{(2n+1)!}{(n+1)!}$    (b) $\dfrac{(2n+1)!}{(n!)^2}$    (c) $\dfrac{(2n)!}{(n!)^2}$    (d) $\dfrac{(2n)!}{(n!)}$

**47.** The standard deviation of a set of values is 2.5. Now 16 is added to each of the given set of values. The standard deviation of the new set of values is

(a) 2.5     (b) 6.5     (c) 18.5     (d) none

**48.** If matrix $A = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$, $B = \begin{bmatrix} a_1 & b_1 & c_1 & d_1 \\ a_2 & b_2 & c_2 & d_2 \\ a_3 & b_3 & c_3 & d_3 \end{bmatrix}$ then the

following system of equations $a_1 x + b_1 y + c_1 z = d_1$,

$a_2 x + b_2 y + c_2 z = d_2$, $a_3 x + b_3 y + c_3 z = d_3$

has a unique solution it
(a) Rank A=3             (b) Rank B=3
(c) Rank A= Rank B=3     (d) Rank A=Rank B=2

**49.** If $A = 3 + \cfrac{4}{3 + \cfrac{4}{3 + \ldots\ldots}}$ and

$B = 3 + \cfrac{3 + \cfrac{3 + \ldots\ldots}{4}}{4}$ and

(a) A>B    (b) A<B    (c) A=B=4    (d) A=B=5

**50.** $\overrightarrow{OA}$ and $\overrightarrow{OB}$ are two vectors such that $\left|\overrightarrow{OA}+\overrightarrow{OB}\right| = \left|\overrightarrow{OA}+2\overrightarrow{OB}\right|$.

Then
(a) $\angle$ BOA=90°          (b) $\angle BOA$ >90°
(c) $\angle$ BOA <90°         (d) 60° $\leq \angle$ BOA $\leq$ 90°

**51.** A vector of magnitude 5 and perpendicular to

$2\vec{i} + \vec{j} - 3\vec{k}$ and $\vec{i} - 2\vec{j} + \vec{k}$ is

(a) $\dfrac{5\sqrt{3}}{3}(\vec{i} + \vec{j} + \vec{k})$      (b) $\dfrac{5\sqrt{3}}{3}(\vec{i} + \vec{j} - \vec{k})$

(c) $\dfrac{5\sqrt{3}}{3}(\vec{i} - \vec{j} + \vec{k})$      (d) $\dfrac{5\sqrt{3}}{3}(-\vec{i} + \vec{j} + \vec{k})$

**52.** From a point $p(x_1, y_1)$ tangents are drawn to the parabola $y^2 = 4ax$, which include a right angle, then
(a) $x_1 = a y_1 = a$
(b) $x_1 = -a y_1 = 10$ always
(c) $x_1 = -a$ and $y_1$ can be any real number

(d) none of these

**53.** If f(x) = $\displaystyle\int_0^{5x^2+3x} \sin t^2 \, dt$ then

(a) f'(x)= sin $(5x^2 + 3x)^2$

(b) f' (x)= (10x+3) sin $(5x^2 + 3x)^2$

(c) f' (x)= $(5x^2 + 3x)$ cos $(5x^2 + 3x)^2$

(d) f' (x)= 2 sin $(5x^2 + 3x)$ cos $(5x^2 + 3x)$

**54.** For every continuous function f(x) the integral

$\displaystyle\int_{-n/2}^{n/2} \{f(x) - (f(-x)\} \, dx$ is equal to :

(a) $2\displaystyle\int_0^{n/2} \{f(x) + f(-x)\}dx$    (b) $2\displaystyle\int_0^{n/2} f(x)dx$

(c) $2\displaystyle\int_0^{n/2} f(-x)\, dx$          (d) 0

**55.** Let A and B two independent events with probability P(A) : 0<P(A) <1,
P(B) : 0<P(B) <1 then
(a) A and $B^C$ are independent
(b) P(A) + P(B) $\leq 1$
(c) P(A $\cup$ B)=1
(d) A and B are mutually exclusive

**56.** The maximum value of xy subject to x + y=8 is
(a) 8     (b) 16     (c) 20     (d) 24

**57.** If x and y are deviations from the arithmetic average r=0.8, $\sum$ xy=60, $\sigma_y$ =2.5 and $\sum x^2$ =90, the number of items in the data is

(a) 10     (b) 15     (c) 18     (d) 20

**58.** Let $I = \displaystyle\int_0^1 \dfrac{e^x}{x+1} dx$, then the value of the integral

$\displaystyle\int_0^1 \dfrac{x\, e^{x^2}}{x^2 + 1} \, dx$ is

(a) $I^2$     (b) $\dfrac{I}{2}$     (c) $2I$     (d) $\dfrac{1}{2}I^2$

**59.** The sum of the series $1 + \dfrac{2^2}{2!} + \dfrac{3^2}{3!} + \dfrac{4^2}{4!} + \ldots$ is

(a) 2e     (b) 3e     (c) 2e-1     (D) none

**60.** The value of $\displaystyle\int_0^\pi \theta \sin^2 \theta \cos \theta \, d\theta$ is equal to

(a) $-\dfrac{1}{9}$     (b) $-\dfrac{2}{9}$     (c) $-\dfrac{4}{9}$     (d) none

**61.** The coefficient of the term independent of x in the expansion of

$(1+x+2x^3)\, (\dfrac{3}{2}x^2 - \dfrac{1}{3x})^9$ is

(a) $\dfrac{1}{3}$     (b) $\dfrac{1}{4}$     (c) $\dfrac{17}{54}$     (d) none of these

**62.** If $\alpha, \beta$ are the roots of $x^2 + px + 1 = 0, \gamma, \delta$ the roots of $x^2 + qx + 1 = 0$, then $(\alpha - \gamma)(\beta - \gamma)(\alpha + \delta)(\beta + \delta) =$

(a) $p^2$          (b) $q^2$          (c) $p^2 - q^2$     (d) $q^2 - p^2$

**63.** The system of equations kx + y + z=1, x + ky + z=k and x + y + kz=$k^2$ has no solution if k equals

(a) 0          (b) 1          (c) –1          (d) –2

**64.** If the lines $a_1 x + b_1 y + c_1 = 0$ $and$ $a_2 x + b_2 y + c_2 = 0$ cut the coordinate axes in concyclic points then

(a) $a_1 a_2 = b_1 b_2$                          (b) $a_1 b_1 = a_2 b_2$

(c) $a_1 b_2 = a_2 b_1$                          (d) none of these

**65.** If $\dfrac{bc}{ad} = \dfrac{b+c}{a+d} = 3\left(\dfrac{b-c}{a-d}\right)$, then a, b, c are in

(a) A.P.          (b) G.P.          (c) H.P.          (d) none

**66.** If a + b +c = $\alpha d$; b + c + d= $\beta$ a and a, b and c are non-coplanar. Then a + b + c + d is equal to

(a) $\alpha$ a          (b) $\beta$ b          (c) $(\alpha + \beta)c$          (d) none

**67.** If $U_n = \displaystyle\int_0^{n/2} \dfrac{1 - \cos 2nx}{1 - \cos 2x} dx$. Then the value of the determinant

$\begin{vmatrix} \pi/2 & U_2 & U_3 \\ U_4 & U_5 & U_6 \\ U_7 & U_8 & U_9 \end{vmatrix} is$

(a) 0          (b) 1          (c) 2          (d) none of these

**68.** The value of tan $1^0$ tan $2^0$ tan $3^0$ …….. tan 89° is

(a) 0          (b) 1 / 2          (c)1          (d) none of these

**69.** The value of $\displaystyle\int_{-2}^{2} (ax^3 + bx + c)\, dx$ depends on

(a) the value of a          (b) the value of b
(c) the value of c          (d) none of these

**70.** $\displaystyle\int_0^{\pi} \left(\dfrac{\sin n\theta}{\sin \theta}\right)^2 d\theta$ is equal to

(a) 0          (b) $\pi$          (c) $n\pi$          (d) none of these

**71.** The median of a given frequency distribution is found graphically with the help of
(a) Histogram          (b) Pie chart
(c) Ogive          (d) frequency curve

**72.** Equation $e^x$ +sinx+x-2=0 is a
(a) Trigonometric function          (b)Transcendental function
(c) Algebraic function          (d) none of these

**73.** If X and Y are independent random variables B(5, 1/2 ) and B(7, 1/2) then P(X+Y ≥ 1) is equal to
(a) 1/2          (b) 1023/1024
(c) 4045/4096          (d) none of these

**74.** If X follows the binomial distribution with parameters n= 6 and p and 9P(X=4)=P(x=2). The p is equal to
(a) 1/2          (b) 1/3          (c) 1/4          (d) none of these

**75.** The value of $\dfrac{c_1}{c_0} + 2\dfrac{c_2}{c_1} + 3\dfrac{c_3}{c_2} + .... + n\dfrac{c_n}{c_{n-1}}$ is equal to

(a) $\dfrac{n(n-1)}{2}$          (b) $\dfrac{n(n+1)}{2}$

(c) $\dfrac{(n+1)(n+2)}{2}$          (d) none of these

**76.** If $\dfrac{a-x}{px} = \dfrac{a-y}{qy} = \dfrac{a-z}{rz}$ and p, q, r are in A.P. Then x, y, z are in

(a) AP          (b) GP          (c) HP     (d) none of these

**77.** The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has
(a) no solution          (b) one solution
(c) two solutions          (d) none of these

**78.** If $y_1$ =secx and $y_2$ =sinx. Then $\dfrac{dy_1}{dy_2}$ $is$

(a) sinx $\sec^3 x$     (b) $\sec^3 x$     (c) tanx sec x          (d) none of these

**79.** If A and B are events such that P(A∪B)=5/6, P(A∩B)=1/3, P($\overline{B}$)=1/2, then the events A and B are
(a) dependent          (b) independent
(c) mutually exclusive          (d) none of these

**80.** If the line ax + by + c=0 is normal to xy=1 then
(a) a > 0, b > 0          (b) a < 0, b < 0
(c) a <0, b > 0          (d) none of these

**81.** The total number of terms in the expansion of $(x - y + 2z)^n$ is 45. Then n is
(a) 7          (b) 8          (c) 9     (d) none of these

**82.** If a line makes angles $\alpha$ $\beta$ $\gamma$ with x-axis, y-axis and z-axis resp., then the value f $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma$ is equal to
(a) 1          (b) 2          (c) 3     (d) none of these

**83.** In the previous problem, value of $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma$ is
(a) 1          (b) 2          (c) 3     (d) none of these

**84.** $\displaystyle\lim_{x \to \tan^{-1} 3} \dfrac{\tan^2 x - 2\tan x - 3}{\tan^2 x - 4\tan x + 3}$ $is$ equal to

(a) 0          (b) 2          (c) 12          (d) none of these

**85.** If y $= \cot^{-1}\left(\dfrac{1-x}{1+x}\right)$, $then$ $\dfrac{dy}{dx}$ is

(a) $\dfrac{1}{(1+x^2)}$          (b) $-\dfrac{1}{(1+x^2)}$          (c) $\dfrac{x}{(1+x)^2}$          (d) none of these

**86.** For what value of $\lambda$, the system of equations x + y + z =1, x +2y +4z= $\lambda$, x + 4y + 10z= $\lambda^2$ is consistent?

(a) $\lambda$ =1, 2          (b) $\lambda$ =1, -2          (c) $\lambda$ =-1, 2          (d) -1, -2

**87.** (A × B). {(B × C) × (C × A) } is (A, B, C are non-coplanar)

(a) [A B C]     (b) $\begin{bmatrix} A\ B\ C \end{bmatrix}^2$     (c) (A × B) × C          (d) none of these

**88.** $\displaystyle\int_0^{\pi/2} \dfrac{dx}{1 + \sqrt{\tan x}}$ $is$

(a) 0          (b) $\pi / 4$          (c) $\pi / 2$          (d) none of these

**89.** $\displaystyle \lim_{x \to 0}$ $(\cos x)^{\cot^2 x}$ is

(a) $-\dfrac{1}{2}$          (b) –1          (c) 0          (d) none of these

**90.** The point at which the tangent to the curve y = $x^2$ -3x + 1 is parallel to y - 3x + 1=0 is
(a) (0, 0)          (b) (3, 1)          (c) (3, 0)          (d) (0, 1)

**91.** If A is a square matrix of order 4 and I is a unit matrix, then it is true that
(a) det (2A)          = 16 det (A)          (b) det (-A)          = -det A
(c) det 2(A)          = 2 det (A)          (d) none of these

**92.** The system of equations
x + 2y +3z = 4
2x +3y +8z = 7
x – y +9z =1 have

(a) Unique solution                      (b) no solution
(c) infinite solution                    (d) none of these

**93.** The line y=mx will be bisector of the angle between the lines given by $ax^2$ -2hxy+ $by^2$ =0, if

(a) (a-b)h + $m^2$ ab=0                 (b) hab= m(a-b)

(c) h(1- $m^2$ )=m(b-a)                 (d) none of these

**94.** The equation $ax^2$ + 2hxy + b $y^2$ + 2gx + 2fy + c=0 will represent two parallel lines, if

(a) $h^2$ = ab, $ag^2$ =b $f^2$        (b) $h^2$ = ab, $bg^2$ = $af^2$

(c) $ah^2$ = $bg^2$ , $g^2$ =ac        (d) none of these

**95.** The expression $\sqrt{2+\sqrt{2+2\cos 4\theta}}$ is equal to

(a) a cos $\theta$    (b) cos 2 $\theta$    (b) 2 and $\theta$    (d) none of these

**96.** If x= $\sqrt{2}$ and $\log_{10}$ $x^2$ =1 + $\log_{10}$ $\sqrt{y}$ , then the value of y is

(a) 5/2          (b) 2/5          (c) 25/4          (d) none

**97.** The value of $\log_{10}$ tan $1^0$ + $\log_{10}$ tan $2^0$ + ...... + $\log_{10}$ tan $59^0$ is

(a) 0            (b) 1            (c) 2            (d) 3

**98.** The value of cot $16^0$ cot $44^0$ + cot $44^0$ cot $76^0$ - cot $76^0$ cot $16^0$ is

(a) 0            (b) 1            (c) 2            (d) 3

**99.** If acos A = b cos B then the triangle is
(a) isosceles                        (b) equilateral
(c) equilateral or right angled      (d) Isosceles or right angled

**100.** Which of the following is incorrect?
(a) According to law of conservation of momentum if two particles of masses $m_1, m_2$ having velocities $\vec{u}_2, \vec{u}_2$ resp. come into collision and separate with velocities $\vec{v}_1, \vec{v}_2$, then $m_1\bar{u}_1 + m_2\bar{u}_2 = m_1\bar{v}_1 + m_2\bar{v}_2$

(b) If the work done by a force in a displacement from one point to another depends only upon the initial and final positions of the particle and does not depend on the actual path traversed, then that force is called a conservative force. Force of friction and forces of resistance are all non-conservative forces.
(c) According to Principle of conservation of energy, If a particle is acted on by conservative forces only, the total energy i.e., the sum of kinetic energy and potential energy is constant throughout the motion.
(d) Newton's second law of motion is also called law of inertia.

**SECTION B**
**DEDUCTIVE AND LOGICAL ABILITY**
**Direction (Q-101-105)** In these questions, a statement is given followed by four inferences A, B, C, and D. Which of these definitely follows from the given statements?
**101.** 'Soldiers serve their country'.
(a) Those who serve their country are soldiers
(b) Woman do not serve their country because they are not soldiers.
(c) Men generally serve their country
(d) Some men who are soldiers serve their country.
**102.** Most of the student are of outstanding merit.
(a) Some of the student are of outstanding merit.
(b) There are no students who are not of outstanding merit.
(c) There are some students who are below par.
(d) All students are of outstanding merit.
**103.** Most of the pens in that shop are expensive.
(a) There are no cheap pens in that shop.
(b) Some of the pens in that shop are expensive.
(c) There are cheap pens also in that shop
(d) Camlin pens in that shop are expensive.
**104.** If a person is rich, he has a lot of influence.

(a) John has a lot of influence, so he is rich
(b) If a person is not rich, he does not have a lot of influence.
(c) Kasim is rich and so he has a lot of influence.
(d) Poor people cannot have influence.
**105.** Many smokers get cancer.
(a) Cancer patients are smokers      (b) Smoking may lead to cancer.
(c) Most smokers get cancer.         (d) Smoking is injurious to health.
**Direction (Q106-110):** The following pie-chart gives the percentage expenses on various items during book production and sale. Study the pie-chart and answer the following questions.
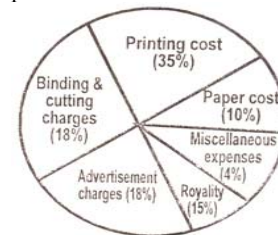


**106.** The 'Paper cost' is approximately what per cent of the 'Printing cost'?
(a) 20.3%          (b) 28.6%          (c) 30%          (d) 32.5%
**107.** If the 'Miscellaneous expenses' are Rs. 6000, how much more are 'Binding and cutting charges' than 'Royalty'?
(a) Rs.6, 000      (b) Rs.5, 500      (c) Rs.4, 500      (d) Rs.10, 500
**108.** The central angle for the sector on 'Paper cost'
(a) 22 1/2°        (b) 16°            (c) 54.8°          (d) 36°
**109.** If the "Printing cost" is Rs.17, 500, the "Royalty" paid is
(a) Rs.8, 750      (b) Rs.7, 500      (c) Rs.3, 150      (d) Rs.6, 300
**110.** The Central angel corresponding to the sector on 'Printing cost' is more than that of 'Advertisement charges' by
(a) 72°            (b) 61.2°          (c) 60°            (d) 54.8°
**111.** Given below is the cycle of words, that is the next word start with the last two letter of the preceding word. What are the missing letters in these words in the direction of arrow?
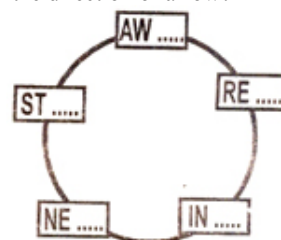


(a) ARE, GAIN, AREST, OLINE, RAWO
(b) ARE, GAIN, CLINE, AREST, RAW
(c) ARAW, AREST, ARE, GAIN, CLINE
(d) GAIN, CLINE, AAREST, RAW, ARE
**Direction: (Q112-119):** In each of the following questions, these is a question mark in which only one of the four alternatives given under the question satisfies the same relationship as is found between the two terms to the left of the sign :: given in the questions. Find the correct answer.
**112.** Day: Night :: Kind : ?
(a) Dark           (b) Bright         (c) Cruel          (d) Generous
**113.** Book :: Library :: flower : ?
(a) Petal          (b) Odour          (c) Garland        (d) Decoration
**114.** President: Republic :: King :?
(a) Democracy      (b) Monarchy       (c) Dictatorship   (d) Parliament
**115.** RBTZ: PDRB :: MGOE :?
(a) OIQG           (c) KEMC           (c) OEQC           (d) KIMG
**116.** Rest: Refresh :: bath :?
(a) Water          (b) Relaxation     (c) Clean          (d) Bathroom
**117.** Poet: Poem::Music:?
(a) Composer       (b) Producer       (c) Writer         (d) Conductor

**118.** Ancient: Modern :: Often :?
(a) Commonly    (b) Frequently    (c) Seldom    (d) New

**119.** Food : Hunger :: Sleep : ?
(a) rest    (b) night    (c) bed    (d) weariness

**Direction (Q120-126):** The pairs of words in questions given below has certain relationship. Your task is to select the choice, which has words with the similar relationship.

**120.** Dark : light
(a) thin : slim    (b) Stout : strong    (c) hot : cold    (d) tree : forest

**121.** Writer : Book
(a) Building: architect    (b) Poem : poet
(c) Chair: Carpenter    (d) Composer : song

**122.** Friend: Good
(a) Dictatorship: evil    (b) Ally: strength
(c) foe : Dangerously    (d) enemy: bad

**123.** Scissors : cloth
(a) Axe : wood    (b) knife : stone    (c) gun : hunt    (d) stone: grinder

**124.** Exempt : obliged
(a) Affluent : fluent    (b) Immure: susceptible
(c) Villiant : mightily    (d)cavalier: presumption

**125.** Writer : test Book
(a) Building : architect    (b) Book : publisher
(c) tailor : weddingsuit    (d)Book:book binder

**126.** Soldier : Regiment
(a) wheels : bearings    (b) coil : water    (c) book : printer    (d) nitrogen : gas

**Direction (Q127-133):** Find odd man out

**127.** (a) Teacher    (b) Professor    (c) Student    (d) Principal

**128.** (a) Pen-Stationary    (b) Shirt-dress
(c) Hat-cap    (d) House-Locality

**129.** (a) Nose    (b) Lungs    (c) Heart    (d) Liver

**130.** (a) July    (b) August    (c) September    (d) October

**131.** (a) different    (b) Separate    (c) distinct    (d) Similar

**132.** (a) Mars    (b) Mercury    (c) Jupiter    (d) Challenge

**133.** (a) Father    (b) Mother    (c) Sister    (d) Mother in law

**Direction (Q134-137):** If 'COLD' is coded as 'DPME'. Select appropriate code from the answer choices for the words given below.

**134.** ZEAL
(a) AFBN    (b) AFBM    (c) AGBM    (d) AFCM

**135.** CHINA
(a) DIJOB    (b) BHIMB    (c) DIJPB    (d) DJKMB

**136.** BACK
(a) DBEM    (b) CBDL    (c) CBEL    (d) CBDM

**137.** GIVEN
(a) HJWJM    (b) HKWJM    (c) HJWJO    (d) HJWFO

**Direction (Q138-141):** The arrangement of numbers in the following questions follows the same pattern. Your task is to find the missing numbers;

**138.**
| 24 | |
|----|----|
| 16 | ? |
| 25 | 8 | 4 |

(a) 3 (b) 6 (c) 7 (d) 9

**139.**
| ? | |
|----|----|
| 25 | 8 |
| 89 | 7 | 5 |

(a) 35 (b) 46 (c) 56 (d) 68

**140.**
| 12 | |
|----|----|
| 49 | 2 |
| ? | 6 | 7 |

(a) 35 (b) 46 (c) 53 (d) 11

**141.**
| 12 | |
|----|----|
| ? | 3 |
| 10 | 9 | 1 |

(a) 1 (b) 2 (c) 8 (d) 10

**Direction (Q142-144):** Find the next term

**142.** 3, 35, 99, 195, ……….
(a) 323    (b) 317    (c) 387    (d) 377

**143.** 5, 26, 126, 626,…….
(a) 3124    (b) 2126    (c) 3125    (d) 3126

**144.** 1, 3, 15, 105, 945,……
(a) 956    (b) 10395    (c) 9995    (d) 19395

**Direction (Q145-146):** Choose the group of words that shows the same relationship as give at the top of every set.

**145.** Village: City: Suburb
(a) Tea: Milk: Sugar    (b) School: College: University
(c) Radio: Transistor: Television    (d) Earth: Mine:Gold

**146.** Pink: Red: White
(a) Brown: Black: Yellow    (b) Yellow: Red: Green
(c) Green: Blue: Yellow    (d) Orange: Yellow: Black

**Direction (Q147-150):** The items given in the following questions have something in common. Thick mark the most appropriate choice.

**147.** Madras: Vishakhapatnam: Rangoon
(a) They are Indian navel basis
(b) All these ports are situated on the coast of the Bay of Bengal
(c) They are capitals states
(d) They are famous for their architecture.

**148.** Tola: Masha: Ratti
(a) They are units of time
(b) They are units of weight
(c) They are fruits of wild plants
(d) They are terms used in Ayurveda

**149.** Delhi: Agra: Mathura
(a) They have been capitals of the country
(b) They have been exquisite temples
(c) They have religious background
(d) They are situated on the bank of river Yamuna.

**150.** Jane Austin: Earnest Hemingway: Sarojini Naidu
(a) They were freedom fighters    (b) They were governess
(c) They were writers    (d) They were scientist