# NATIONAL UNIVERSITY OF SCIENCE & TECNOLOGY (NUST)

## Engineering Admission Test 02

**MATHEMATICS**

***Directions:*** *For each question below you are given four choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*

***ALL ANSWER MUST BE GIVEN ON THE ANSWER SHEET.***

*YOUR ANSWERS MUST BE INDICATED BY LETTERS (A, B, C, D) AND NOT BY THE WORDS THEMSELVES.*

**1.** The fifth term of the sequence $a_n = 2n - 3$ is_____.

A) 13 B) -13

C) 7 D) -7

**2.** The harmonic mean between a and b is

A) $\frac{a+b}{2}$ B) $\pm\sqrt{ab}$

C) $\frac{a-b}{2}$ D) $\frac{2ab}{a+b}$

**3.** $\frac{8!}{6!}$ = _____ .

A) 8 B) $\frac{1}{56}$

C) 56 D) None of these

**4.** ${}^{16}C_{11} + {}^{16}C_{10} =$_____.

A) ${}^{16}C_{10}$ B) ${}^{15}C_{11}$

C) ${}^{17}C_{10}$ D) ${}^{17}C_{11}$

**5.** In the expansion of $(a+x)^n$ the sum of exponents of a and x in each term of the expansion is

A) N + 1 B) n-1

C) N D) 2n

**6.** The number of terms in the expansion of $\left[x^2 - \frac{4}{x^2}\right]^9$ is

A) 8 B) 9

C) 10 D) 11

**7.** $\text{Cos}^2 \frac{\theta}{2} + \sin^2 \frac{\theta}{2}$ =_____.

A) 2 B) $\frac{1}{2}$

C) 1 D) None of these

**8.** The area of a sector of a circular region of radius r and central angle $\theta$ radian s is

A) $r^2\theta$ B) $\frac{1}{2}r^2\theta$

C) $r\theta$ D) $\frac{1}{2}r^2\theta$

**9.** Cos $(2\pi + \theta)$=_____.

A) Sin $\theta$ B) Cos $\theta$

C) -sin $\theta$ D) - cos $\theta$

**10** 2 sin $a \cos\beta$ =_____.

A) Cos $(a+\beta) - \cos(a-\beta)$ B) Cos $(a+\beta) + \cos(a-\beta)$

C) Sin $(a+\beta) - \sin(a-\beta)$ D) Sin $(a+\beta) + \sin(a-\beta)$

**11** Period of sin 3x is_____.

A) $\frac{\pi}{3}$ B) $\frac{2\pi}{3}$

C) $\pi$ D) $2\pi$

**12** Range of tan x is_____.

A) R B) [-1,1]

C) $\left[-\frac{1}{2},\frac{1}{2}\right]$

D) None of these

**13** Sin $\frac{a}{2}$ = _____ .

A) $\sqrt{\frac{(s+b)(s+c)}{bc}}$

B) $\sqrt{\frac{(s-b)(s-c)}{bc}}$

C) $\sqrt{\frac{bc}{(s-b)(s-c)}}$

D) $\sqrt{\frac{s(s-a)}{bc}}$

**14** In = radius of $\Delta$ABC is

A) R= $\frac{\Delta}{s}$

B) R= $\frac{abc}{4\Delta}$

C) R= $\frac{\Delta}{s-b}$

D) R= $\frac{abc}{4s}$

**15** The solution of the equation 3 $\tan^2 x = 1$ is_____.

A) $\left\{\frac{\pi}{6}+n\pi\right\}\cup\left\{\frac{5\pi}{6}+n\pi\right\},n\in Z$

B) $\left\{\frac{\pi}{3}+2n\pi\right\}\left\{\frac{2\pi}{3}+2n\pi\right\},n\in Z$

C) $\left\{\frac{\pi}{4}+n\pi\right\}\cup\left\{\frac{5\pi}{4}+n\pi\right\},n\in Z$

D) None of these

**16** If $f(x) = x^3-2x^2 + 4x - 1$ then f(0) is

A) 0

B) 1

C) -1

D) None of these

**17** F(x) = x is

A) Trigonometric function

B) Exponential function

C) Quadratic function

D) None of these

**18** F(x) = tan x is

A) Even function

B) Odd function

C) Linear function

D) None of these

**19** If f is a bijective a function then $f(f^{-1}(x))$ is

A) X
B) 0
C) 1
D) -1

**20** $\lim_{x\to 0}\frac{\sin ax}{\sin bx}$ =_____.

A) 1
B) $\frac{b}{a}$
C) $\frac{a}{b}$
D) None of these

**21** If f(x) = $\tan^{-1} x$ then f (tan x) =_____.

A) 0
B) -1
C) 1
D) 2

**22** $\frac{d}{dx}\left[\tan^{1} x\right]$=_____ .

A) $\frac{1}{x\sqrt{x^2-1}}$
B) $Sec^2x$
C) $Sin^2 x$
D) $Cos^2x$

**23** $\frac{d}{dx}(\cosh 2x)$=_____ .

A) 2 cos h 2x
B) -2sin h 2x
C) 2 sin h 2x
D) 2 cot h 2x

**24** If f(x) = $\tan^{-1} x$ then f (tan x) =_____.

A) $\frac{1}{1+x^2}$
B) $Sec^2 x$
C) $Sin^2 x$
D) $Cos^2 x$

**25** The function f(x) = $3x^2$ has extreme value at

A) X = 1
B) X = 3
C) X = 6
D) X = 0

**26** $\int\frac{2x-1}{x^2-x+1}$ dx =_____.

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

B) $\ln (x^2 - x + 1) + c$

C) $\frac{x^3}{3} - \frac{x^2}{2} + x + c$

D) $\ln (2x - 1) + c$

**27** $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx =$ _____.

A) $\ln |e^x - e^{-x}| + c$

B) $\ln |e^x + e^{-x}| + c$

C) $E^x + e^{-x} + c$

D) $E^x - e^{-x} + c$

**28** $\int e^x \left[ \tanh^{-1} x + \frac{1}{1 - x^2} \right] dx =$ _____ .

A) $e^x \tan h^{-1} x + c$

B) $e^x \cot h^{-1} x + c$

C) $\frac{e^x}{1 - x^2} + c$

D) $e^x \operatorname{cosec} h^{-1} x + c$

**29** $\int_0^2 x^2 dx =$ _____.

A) $\frac{2}{3}$

B) $\frac{4}{3}$

C) $\frac{8}{3}$

D) None of these

**30** The mid point of the line segment joining the points A (-B, 3) an B(2, -1) is

A) (-3, 1)

B) (-6, 2)

C) (5, 2)

D) (-5, 2)

**31** The latus rectum of the parabola $x^{2+} = -4ay$ is

A) X= a

B) Y = -a

C) Y = a

D) X = -a

**32** The vertices of the ellipse $4x^2 + 9y^2 = 36$ are

A) ( $\pm$ 3, 0)

B) $(\pm\sqrt{5,0})$

C) (0, $\pm$ 2)

D) None of these

**33** The magnitude of the vector

$\vec{r} = a_1 \hat{i} + a_2 \hat{j} + a_3 \hat{k}$ is

A) $A_1 + a_2 + a_3$

B) $\sqrt{a_1 + a_2 + a_3}$

C) $a_1^2 + a_2^2 + a_3^2$

D) $\sqrt{a_1^2 + a_2^2 + a_3^2}$

**34** If dot product of two vectors is zero then the vector are

A) Collinear

B) Perpendicular

C) Parallel

D) None of these

**35**

If $3\hat{i} + 9\hat{j} + 3\hat{k}$ and - $i + 4\hat{j} - x\hat{k}$ are perpendicular then

A) X = 2

B) X 11

C) X = 14

D) X = -33

**36** $\forall, a, b.c \in R, a = b \wedge b \Rightarrow a = cis$

A) Reflexive property

B) Symmetric property

C) Transitive property

D) Additive property

**37** The value of $i^{-3}$ =

A) 1

B) -1

C) i

D) -i

**38** What is the number of elements of the power set of $\{\}$?

A) 0

B) 1

C) 2

D) 3

**39** A binary operation * is called commutative in S if $\forall$ a, b, $\in$ S.

A) A * b= b * a

B) A * b= -b * a

C) AB = BA

D) None of these

**40** If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ then order of $A^t$ is

A) 3x 1

B) 1x3

C) 3x3

D) 1x1

**41** If n is any positive integer then $4^n > 3^n +$ is true for all

A) $n \leq 2$

B) N<3

C) N >2

D) $n \geq 2$

**42** If sin $\theta$ is in

A) I and III quadrants

B) II and III quadrants

C) I and II quadrants

D) II and IV quadrants

**43** If sin $\theta$ <0 then $\theta$ is in

A) I quadrant

B) II quadrant

C) III quadrant

D) IV quadrant

**44** Sec $\left(a + \frac{\pi}{2}\right)$=_____.

A) Sec a

B) Cosec a

C) - sec a

D) - cosec a

**45** 1- cos 2a =_____.

A) $2 \sin^2 a$

B) $2 \cos^2$

C) 2 sec $a$

D) None of these

**46** Period of sin $\frac{x}{3}$ is_____.

A) $\pi$

B) $3\pi$

C) $\frac{2\pi}{3}$

D) $6\pi$

**47** The Period of 3 sin $\frac{x}{3}$ is _____.

A) $\pi$

B) $2\pi$

C) $3\pi$

D) $6\pi$

**48** Cos $\frac{a}{2}$ = _____.

A) $\sqrt{\frac{s(s+a)}{bc}}$

B) $\sqrt{\frac{(s-b)(s-c)}{bc}}$

C) $\sqrt{\frac{s(s-a)}{bc}}$

D) $\sqrt{\frac{(s+b)(s+c)}{bc}}$

**49** Area of $\Delta$ ABC = _____.

A) Ab sin $a$

B) $\frac{1}{2}$ ab sin $a$

C) $\frac{1}{2}$ ab sin $y$

D) $\frac{1}{2}$ ab sin $\beta$

**50** The solution of the equation 1 + cos x – 0 is ------.

A) $\left\{\frac{\pi}{2}+2n\pi\right\}\cup\left\{\frac{3\pi}{2}+2n\pi\right\}, n\in Z$

B) $\{\pi+2n\pi\}, n\in Z$

C) $\left\{\frac{\pi}{4}+2n\pi\right\}\cup\left\{\frac{5\pi}{2}+2n\pi\right\}, n\in Z$

D) None of these

**51** If f (x) – sex x then f $\left(\frac{\pi}{3}\right)$ is

A) 0

B) 1

C) 2

D) $\frac{1}{2}$

**52** f (x)=C is

A) Identity function

B) Constant function

C) Linear function

D) Quadratic function

**53** Cos $h^2$ x + sin $h^2$ x = --------.

A) Sin h 2x

B) - sin h 2x

C) Cos h 2x

D) - cos h 2x

**54** $\lim_{x\to 0}\frac{e^x - 1}{x}$ = ----------

A) e

B) 1

C) N $a^{n-1}$

D) $\text{Log}_e\, a$

**55** $\lim_{x\to \theta}\frac{1-\cos\theta}{\theta}$ = ----------

A) 0

B) 1

C) 2

D) Does not exite

**56** If f(x) = $\frac{1}{x^2}$ then f (x) = ------ --.

A) $-2x^3$

B) $2x^{-3}$

C) $-2x^{-3}$

D) $2x^3$

**57** Derivative of $x^3$ w.r.t.$x^3$is

A) 0

B) 1

C) $3x^2$

D) $x^3$

**58** $\frac{d}{dx}\left(2^x\right)$ = .....

A) $2^x$

B) $2^x$ ln x

C) 2xln 2

D) $\frac{2^x}{In2}$

**59** If f(x) = cos x then f (tan x) = -----.

A) $-\frac{1}{1+x^2}$

B) - $\text{cosec}^2$x

C) $\text{Sec}^2$ x

D) $-\cos^2$ x

**60** If f(x) = cos x then f (0) =------ --.

A) 0

B) 1

C) -1

D) None of these

**61** $\int \frac{dx}{ax+b}$ = ..... .

A) A In$|ax+b|$ + c

B) $\frac{1}{a} in|ax+b|$+c

C) -a In$|ax+b|$ + c

D) . $\frac{1}{a} in|ax+b|$+c

**62** $\int a^{\cos x}$ Sin x dx = ..... .

A) $a^{\cos x}$ + c

B) - $\frac{a^{\cos x}}{Ina}$ + c

C) $\frac{a^{\cos x}}{Ina}$ + c

D) $a^{\cos x}$ . In a + c

**63** $\int \frac{dx}{9+x^2}$ = _____ .

A) $\frac{1}{3}\sec^{-1}\left(\frac{x}{3}\right)+c$

B) $\frac{1}{3}\tan^{-1}\left(\frac{x}{3}\right)+c$

C) $\frac{1}{3}\cos ec^{-1}\left(\frac{x}{3}\right)+c$

D) $\frac{1}{9}\tan^{-1}\left(\frac{x}{3}\right)+c$

**64** $\int_0 \frac{dx}{\sqrt[1]{1-x^2}}$ = _____ .

A) $\frac{\pi}{6}$

B) $\frac{\pi}{3}$

C) $\frac{\pi}{4}$

D) $-\frac{\pi}{6}$

**65** The distance between the pints (2,2) and (3,3) is

A) 10 B) $\overline{\sqrt{2}}$

C) 5 D) 2

**66** The lines $l_1, l_2$ with slopes $m_1, m_2$ are perpendicular if

A) $M_1, m_2 = -1$ B) $M_1, m_2 = 1$

C) $m_1, = m_2$ D) $M_1 + m_2 = 0$

**67** The equation of the line bisecting the first and third quadrants is

A) Y = x B) Y = -x

C) Y = a D) X = a

**68** The perpendicular distance of the line 12x + 5y = 7 from the origin is

A) $\frac{7}{13}$ B) $\frac{13}{7}$

C) $\frac{17}{13}$ D) $\frac{1}{13}$

**69** (1,2) is in the solution of the inequality

A) 2x + y > 8 B) $2x + y \leq 6$

C) 2x – y > 1 D) 2x + 3y < 2

**70** The quotation of the normal to the circle $x^2 + y^2 = 25$ at (4,3) is

A) 3x – 4y = 0 B) 3x – 4y = 5

C) 4x + 3y = 5 D) 4x + 3y = 25

**71** The latus rectum of the parabola $x^{2+} = -4ay$ is

A) X= a B) Y = -a

C) Y = a D) X = -a

**72** The vertices of the ellipse $4x^2 + 9y^2 = 36$ are

A) ( $\pm$ 3, 0) B) $(\pm\sqrt{5},0)$

C) (0, $\pm$ 2) D) None of these

**73** The magnitude of the vector

$\vec{r} = a_1 \hat{i} + a_2 \hat{j} + a_3 \hat{k}$ is

A) $A_1 + a_2 + a_3$

B) $\sqrt{a_1 + a_2} + a_3$

C) $a_1^2 + a_2^2 + a_3^2$

D) $\sqrt{a_1^2} + a_2^{\ 2} + a_3^{\ 2}$

**74** If dot product of two vectors is zero then the vector are

A) Collinear

B) Perpendicular

C) Parallel

D) None of these

**75** If $3\hat{i} + 9\hat{j} + 3\hat{k}$ and $-\hat{i} + 4\hat{j} - x\hat{k}$ are perpendicular then

A) X = 2

B) X 11

C) X = 14

D) X = -33

**76** $\forall, a, b.c \in R, a = b \wedge b \Rightarrow a = cis$

A) Reflexive property

B) Symmetric property

C) Transitive property

D) Additive property

**77** The value of $i^{-3}$ =

A) 1

B) -1

C) i

D) -i

**78** What is the number of elements of the power set of $\{\}$?

A) 0

B) 1

C) 2

D) 3

**79** A binary operation * is called commutative in S if $\forall$ a, b, $\in$ S.

A) A * b= b * a

B) A * b= -b * a

C) AB = BA

D) None of these

**80** If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ then order of $A^t$ is

A) 3x 1
B) 1x3
C) 3x3
D) 1x1

## PHYSICS

***Directions:*** *For each question below you are given four choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*

***ALL ANSWER MUST BE GIVEN ON THE ANSWER SHEET.***

*YOUR ANSWERS MUST BE INDICATED BY LETTERS (A, B, C, D) AND NOT BY THE WORDS THEMSELVES.*

**81.** Which of the following is a scalar quantity

(a) Density (b) Displacement (c) Torque (d) Weight

**82.** Which of the following is the only vector quantity

(a) Temperature (b) Energy (c) Power (d) Momentum

**83.** Which of the following lists of physical quantities consists only of vectors:

(a) Time, temperature, velocity
(b) Force, volume, momentum
(c) Velocity, acceleration, mass
(d) Force, acceleration, velocity

**84.** The rectangular components of a vector have angle between them

(a) $0^0$ (b) $60^0$ (c) $90^0$ (d) $120^0$

**85.** A force of 10N is acting along y-axis. Its component along z-axis is

(a) 10N (b) 20N (c) 100N (d) Zero N

**86.** Two forces are acting together on an object. The magnitude of their resultant is minimum when the angle between the force is

(a) $0^0$ (b) $60^0$ (c) $120^0$ (d) $180^0$

**87.** Two forces of 10N and 15N are acting simultaneously on an object in the same direction. Their resultant is

(a) Zero (b) 5N (c) 25N (d) 150N

**88.** If the dot product of two non-zero vectors vanishes, the vectors will be

(a) In the same direction (b) Opposite to each other (c) Perpendicular to each other (d) Zero

**89.** If two non-zero vector $\vec{A}$ and $\vec{B}$ are parallel to each other, then $\vec{A} \cdot \vec{B}$ is equal to

(a) Zero (b) AB (c) A + B (d) A – B

**90.** The dot product of two vectors is negative when

(a) They are parallel vectors (b) They are anti-parallel vectors

(c) They are perpendicular vectors (d) None of the above is correct

**91.** The vector product of two vectors is zero, when

(a) They are parallel to each other (b) They are perpendicular to each other

(c) They are equal vectors (d) They are inclined at angle of $60^0$

**92.** If $(\vec{a} \times \vec{b})$ points along positive z-axis, then the vectors $\vec{a}$ and $\vec{b}$ must lie in

(a) Ax-plane (b) Yx-plane

(c) Xy-plane (d) None of the above

**93.** The position vector of a point in xz-plane is given by

(a) $\vec{r} = x\,\hat{i} + y\,\hat{j}$ (b) $\vec{r} = y\,\hat{i} + z\,k$ (c) $\vec{r} = x\,\hat{i} + y\,\hat{j} + z\,k$ (d) $\vec{r} = x\,\hat{i} + z\,k$

**94.** If $\vec{A} = A_1\hat{i} + A_2\hat{j}$ and $\vec{B} = B_1\hat{i} + B_2\hat{j}$ are non-parallel vectors, then the direction of $\vec{A} \times \vec{B}$ is

(a) Along $\vec{B}$ (b) Along x-axis (c) Along y-axis (d) Along z-axis

**95.** If $\vec{A} \cdot \vec{B} = 0$ and also $\vec{A} \times \vec{B} = 0$, then

(a) $\vec{A}$ and $\vec{B}$ are perpendicular to each other (b) $\vec{A}$ and $\vec{B}$ are parallel to each other

(c) $\vec{A}$ and $\vec{B}$ are anti-parallel to each other (d) Either $\vec{A}$ or $\vec{B}$ is a null vector

**96.** if $\hat{i}, j, k$ are unit vectors along x,y, and z-axes, the $k \times j$ = .....

(a) $\hat{i}$ (b) $j$ (c) $-k$ (d) $-\hat{i}$

**97.** The speed of an object at the end of 4 successive seconds is 20, 25, 30, and 35 mi/hr, respectively. The acceleration of this object is

A) $5 \text{ ft per sec}^2$ B) 5 mi per hr per sec C) 5 mi per $hr^2$ D) 5 mi per $sec^2$

**98.** A bomb is dropped from an airplane moving horizontally with a speed of 600 km/h. If the air resistance is negligible, the bomb will reach the ground in 5 s when the altitude of the plane is approximately

A) $50 \text{ m}$ B) 75 m C) 125 m D) 250 m

**99.** If the values of instantaneous and average velocities are equal, the body is said to be moving with

(a) Uniform acceleration (b) Uniform speed (c) Variable velocity (d) Uniform velocity

**100.** A stone is dropped from a cliff. The time during which it covers a distance of 490 m is

(a) 10 sec (b) 100 sec (c) 9.8 sec d) 4.9 sec

**101.** When a person jumps off the ground, the reaction force of the ground is

(a) Greater than the weight of the person (b) Smaller than the weight of the person

(c) Equal to the weight of the person (d) zero

**102.** When a bullet is fired by a gun, the gun recoil backward with a velocity

(a) Less than that of the bullet (b) Equal to that of the bullet

(c) Greater than that of the bullet (d) None of the above

**103.** Which law is applicable in the motion of the rocket in space

(a) Conservation of mass (b) Conservation of energy

(c) Conservation of angular momentum (d) Conservation of linear momentum

**104.** A fog droplet after terminal velocity, falls vertically with an acceleration

(a) Equal to g (b) Less than g (c) Greater than g (d) Equal to zero

**105.** The acceleration of a spherical ball on a smooth inclined plane is maximum when the angle of inclination to the horizontal is

(a) $90^0$ (b) $60^0$ (c) $30^0$ (d) $0^0$

**106.** When a force of 4 N acts on a mass of 2 kg for a time of 2 s, what is the rate of change of momentum?

(a) 1 kg m $s^{-2}$ (b) 2 kg m $s^{-2}$ (c) 4 kg m $s^{-2}$ (d) 8 kg m $s^{-2}$

**107.** In instantaneous velocity is equal to the average velocity if a body moves with a

a) Uniform Velocity b) Variable Velocity (c) Uniform Acceleration (d) Variable Acceleration

**108.** A person standing in an elevator which goes up with constant upward acceleration exerts a push on the floor of the elevator whose value.

A) is always equal to his weight B) is always greater than his weight C) is always less than his weight D) Is zero

**109.** Which of the following statements is correct for a particle moving in a horizontal circle with constant angular velocity?

(a) The linear momentum is constant but the kinetic energy varies

(b) The kinetic energy is constant but the linear momentum varies

(c) Both kinetic energy and linear momentum are constant

(d) Neither the linear momentum nor the kinetic energy is constant

**110.** A point on the rim of a wheel moves 0.2 m when the wheel turns through an angle of 0.1 rad. What is the radius of the wheel.

(a) 0.5 (b) 2 m (c) 0.2 m (d) 20 m

**111.** Value of Boltzman constant is

A) $1.38\ JK^{-1}$ B) $1.38 \times 10^{-23}\ JK^{-1}$

C) $6.21 \times 10^{-12}$ D) None

**112.** Least distance of distinct vision in man is

A) 10 cm B) 20 cm

C) 15 cm D) 25 cm

**113.** Two farces of same magnitude are acting on an object, the magnitude of their resultant is minimum if the angle between them is

A) 45° B) 60°

C) 90° D) 180°

**114.** If two forces each of magnitude 5N act along the same line on a body, then the magnitude of their resultant will be

A) 5N B) 10N

C) 20N D) 30N

**115.** Applied force F on a body of mass m, moving with acceleration a is

A) m/a B) a/m

C) ma D) m : a

**116.** A force of 1000N acts on a body for 0.01 sec. And changes its velocity from 10m/s to 20m/s, what will be the impulse?

A) 100 N-sec B) 50 N-sec

C) 10 N-sec D) 5 N-sec

**117.** When a projectile moves upwards, its vertical component of velocity

A) Remains constant B) Decreases

C) Increases
D) Becomes equal to horizontal velocity

**118.** At the highest point, a projectile has its vertical component of velocity equal to

A) Maximum
B) Minimum
C) Equal to horizontal component of velocity
D) Equal to initial velocity

**119.** The speed of efflux is equal to the velocity gained by the fluid in falling though the distance ($h_1 - h_2$) under the action of gravity. This is the statement of

A) Bernoulli's theorem
B) law of continuity
C) Fluid law
D) torricelli's theorem

**120.** Angular momentum is defined as

A) The dot product of position vector and linear momentum
B) The cross product of position vector and linear momentum
C) The simple product of position vector and liner momentum
D) The product of distance and liner momentum

**121.** Newton's Law of Gravitation states that the force of attraction between two bodies is directly proportional to

A) Product of mass and distance between them
B) Square of the distance between them
C) Product of their masses
D) Product of square of their masses

**122.** If distance between two bodies is doubled and their masses are also doubled the gravitational force will

A) Increase four times
B) Decrease four times
C) Remain constant
D) Remain constant

**123.** The work done by a force acting on a body is maximum when

A) The displacement is zero
B) The force is parallel to the displacement
C) The force is perpendicular to the displacement
D) The force is anti-parallel to the displacement

**124.** If a force F moves a body with velocity V then power is

A) F . V
B) F × V

C) F + V

D) F – V

**125.** When transverse waves propagate through a medium then the particles of the medium

A) Remain at rest

B) Vibrate along the direction of propagation of waves

C) Vibrate perpendicular to the direction of propagation of waves

D) Vibrate at an angle of 180° with the direction of propagation of waves

**126.** When longitudinal waves propagate through a medium, then the particles of the medium

A) Vibrate parallel to the direction of propagation of waves

B) Vibrate perpendicular to the direction of propagation of waves

C) Do not move at all

D) Vibrate at an angle of 270° to the direction of waves

**127.** If a transverse wave has a speed of 100m/sec and frequency of 100 hertz then its wavelength will be

A) 1 m

B) 10 m

C) 100 m

D) 1000 m

**128.** When the speed of a fluid is high, its pressure

A) no effect on pressure

B) is also high

C) is low

D) equal to atmospheric pressure

**129.** Which of the following properties proves that light behaves as waves

I. Interference
II. Diffraction
III. Refraction

A) I and II are correct only

B) II and III are correct only

C) I and II are correct only

D) I, II and III are correct

**130.** At high velocity the motion of a fluid becomes

A) Sreamed line

B) Crcular

C) Oscillatory

D) Turbulent

**131.** Polaroid can be used

A) To control head light glare in night driving
B) To determine the concentration of optically active substance
C) In curtain-less window to adjust the amount of light
D) All of them

**132.** A lens which is thicker in the middle and thinner at the edge is called
A) Concave lens
B) Convex lens
C) Plano-concave lens
D) Convex-concave lens

**133.** A straight line passing through center of curvature of the two spherical surfaces of a lens is called
A) Diameter of the lens
B) Radius of the lens
C) Principal axis
D) Principle focus

**134.** A double convex lens acts as a diverging lens when the object is placed
A) At the focus
B) At 2f
C) Between f and 2f
D) Within the focal length

**135.** Temperature is property which determines
A) How much total absolute energy a body has
B) Fraction of heat removed from a body
C) The ability of a body to transfer heat to other bodies
D) How much heat a body contains

**136.** It becomes difficult to recognize the beats, when the frequency difference of two waves is greater than
A) 2
B) 5
C) 7
D) 10

**137.** When the source of sound is moving towards the stationary listener, the frequency of the sound
A) Remains same
B) decreases
C) increases
D) None of these

**138.** Triple point of water is (in $^{0}C$)
A) 0
B) 273.16

C) 100 D) -273

**139.** When air at 300K and 1 atmospheric pressure is compressed to one-twentieth of its original volume and 30 atmospheric pressure, the new temperature will be

A) 9000 K B) 100 K

C) 450 K D) 450° C

**140.** If a unit charge experiences a force of 10N at a point in an electric field, then the electric field intensity in N/C is

A) 8 B) 9

C) 10 D) 11

## CHEMISTRY

***Directions:*** *For each question below you are given four choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*

***ALL ANSWER MUST BE GIVEN ON THE ANSWER SHEET.***

*YOUR ANSWERS MUST BE INDICATED BY LETTERS (A, B, C, D) AND NOT BY THE WORDS THEMSELVES.*

**141.** Amino acids reacts with nitrous acid to produce alpha-hydroxy carboxylic and

A) $CO_{2\ gas}$ B) $H_2$ gas

C) $N_2$ Gas D) None

**142.** Structural formula of Propanoic acid is

A) H-COOH B) $CH_3COOH$

C) $CH_3CH_2$-COOH D) $CH_3$-$CH_2$-COOH

**143.** Hormone insulin is

A) Carbohydrate in nature B) Protein in nature

C) Lipid in Nature D) Composed of Lipid carbohydrate

**144.** Three-dimensional twisting and folding of the polypeptide chain results

A) Primary structure of protein B) Secondary

C) Tertiary D) Quaternary

**145.** The main organic compound used for the formation of soaps & detergents is

A) Carbohydrates
B) Proteins
C) Amino acids
D) Lipids

**146.** The enzyme that causes the hydrolysis of fats
A) Urease
B) Maltase
C) Zymase
D) Lipase

**147.** The main constituent of protein that imparts green colour to the leaves belong to
A) Nitrogenous fertilizer
B) Phosphates
C) Potassium
D) None

**148.** The reactivity of lithium with respect to all other alkali metals is
A) Most reactive
B) Least reactive
C) Non-reactive
D) Inert

**149.** BeO is Amphoteric in nature
A) React with acids
B) With basis
C) Both with acids and bases
D) Does not react with

**150.** Lime is used in
A) Refining of metals
B) React with sand to form calcium silicate
C) Used in sanitary materials
D) All above

**151.** Menedeleev predicted properties first but the element was discovered after few years. The element was?
A) Gallium
B) Germanium
C) Selenium
D) Indium

**152.** Addition of one or more electrons in the shell of a neutral atom
A) Enhances the attraction between electrons
B) Decreases the attraction
C) Enhances the repulsion
D) Decreases the repulsion

**153.** Shielding effect is the repulsion between
A) Nucleus and the outermost shells
B) Nucleus of one atom and electrons of the other atom

C) Between the electrons of two different atoms

D) Electrons in between the nucleus and the outermost shell

**154.** Carbon is a good conductor of electricity in case of

A) Graphite

B) Diamond

C) Both a & b

D) None

**155.** The elements of group IA and IIA form

A) Covalent hydrides

B) Ionic hydrides

C) Intermediate hydrides

D) None

**156.** Relative atomic mass of an element is the mass of an element relative to

A) 1/12 mass of carbon- 12

B) 1/12 mass of carbon

C) 1 mass of hydrogen atom

D) 1/16 mass of oxygen

**157.** Ascorbic acid contains 40.92% carbon, 4.58%, hydrogen and 54.5% oxygen. The empirical formula is

A) $C_3H_4O_3$

B) $C_2H_4O_3$

C) $C_3H_5O_4$

D) $C_2H_3O_1$

**158.** Which one of the following compounds does not have the empirical formula $CH_2O$?

A) Ethanoic acid, $CH_3CO_2H$

B) Ethanol, $CH_3CH_2OH$

C) Glucose, $C_6H_{12}O_6$

D) Methanal, HCHO

**159.** Two different hydrocarbon each contain the same percentage by mass of hydrogen. It follows that they have the same

A) Empirical formula

B) Number of atoms in a molecules

C) Number of isomers

D) Relative molecular mass

**160.** A balloon contains 0.02 gram of $H_2$ gas, it contain $H_2$ molecules

A) $6.02 \times 10^{23}$

B) $3.01 \times 10^{22}$

C) $6.02 \times 10^{21}$

D) $3.01 \times 10^{21}$

**161.** Methane reacts with steam to form hydrogen and carbon monoxide as shown below

$CH_4 + H_2O \rightarrow 3H_2 + CO$

What volume of hydrogen can be obtained from 100 $cm^3$ of methane (at the same temperature and pressure)?

A) 300 $cm^3$ B) 200 $cm^3$

C) 150 $cm^3$ D) 100 $cm^3$

**162.** How many moles of oxygen, $O_2$ are needed for the complete combustion of two moles of butane, $C_4H_{10}$?

A) 2 B) 8

C) 10 D) 13

**163.** One of the following statements is incorrect

A) Actual yield is always less than the theoretical yield B) The formula of a compound is not definite

C) Law of conservation of mass is applied in stoictiometry D) Boyles law is applied in stoictiometry

**164.** Macromolecules are

A) Organic molecules B) High molecular mass molecules

C) Natural compounds D) Rarely occurring molecules

**165.** A chemical formula based on an actual molecule is called

A) Empirical formula B) Structure formula

C) Molecular formula D) Simples formula

**166.** Energy of electron in an orbit according to Bohr theory is negative due to

A) Repulsion of electrons in the same orbit B) At infinity energy is zero and attraction towards nucleus decreases energy

C) Electron has negative charge D) Product of positive nuclear charge and negative charge is negative

**167.** In order to determine the position of electron the radiation used is

A) Visible light B) Infrared radiations

C) X-rays D) Ultraviolet radiations

**168.** The uncertainty principle is applicable to microscopic particles like electrons because

A) Compton's effect is followed B) Compton's effect is not followed

C) Electrons are material particles D) Electrons are non material in nature

**169.** The total values of magnetic quantum number of subshell are five, the subshell is

A) S-subshell
B) P-subshell
C) D-subshell
D) F-subshell

**170.** The number of waves passing through a point in one second is called

A) Wave number
B) Velocity
C) Frequency
D) Wavelength

## ENGLISH

***Directions:*** *For each question below you are given choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*

### SENTENCE COMPLETION

**Directions**

Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath in sentence are five lettered words or sets of words. Choose the word or set of words that best fits the meaning of the sentence as a whole.

**171.** After years of talking down to his students as if they couldn't understand a word, the teacher finally acknowledged that his attitude was_____.

A. colloquial
B. condescending
C. professorial
D. Justifiable
E. Logical

**172.** There are to many_____and not enough serious workers.

A. sycophants
B. Kleptomaniacs
C. novices
D. dilettantes
E. Zealots

**173.** There was a hint of carelessness about her appearance, as though the cut of her blouse or the fit of her slacks was a matter of_____to her.

A. satisfaction
B. Aesthetics
C. indifference
D. Significance
E. Controversy

**174.** There was a hint of carelessness about her appearance, as though the cut of her blouse or the fit of her slacks was a matter of_____to her.

A. satisfaction
B. Aesthetics
C. indifference
D. Significance
E. Controversy

**ANALOGY**

**Direction:** Each question below consists of a related pairs of words or phrases, followed by five lettered pairs of words or phrases, Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

**175.** SPOKE : WHEEL ::
(a) square : circle
(b) balance : lever
(c) door : latch
(d) book : shelf
(e) rung : ladder

**176.** VESSEL : FLEET ::
(a) wolf : pack
(b) forest : clearing
(c) vehicle : truck
(d) carriage : horse
(e) squadron : rank

**177.** CALLOW : MATURITY ::
(a) incipient : fruition
(b) spoiled : purity
(c) young : old
(d) eager : anxiety

**178.** CARELESSNESS : ACCIDENT ::
(a) assiduity : success
(b) indifference : fruition
(c) care : avoidance
(d) writer : blot

**179.** HYPOCHONDRIAC : HEALTH ::
(a) addict : drugs
(b) miser : money
(c) glutton : food
(d) narcotic : sickness

**ANTONYM**

**Direction:** In each of the following antonym questions, a word printed in capital letters precedes five lettered words or phrases. From these five lettered words or phrases, pick the one most nearly opposite in meaning to the capitalized word.

**180.** PERT:
(A) Polite (B) Deliberate (C) Moral (D) Perishable

**181.** PRAISE:
(A) Reproof (B) Censure (C) Thymol (D) Trustworthy

**182.** PERTINENT:
(A) Puzzling (B) Discontented (D) Irrelevant (D) Understood

**183.** OBLIGATORY:
(A) Friendly (B) Optional (C) Facile (D) Divorced

**184.** OBSOLETE:
(A) Desolate (B) Frightful (C) Heated (D) Renovated

**185.** OPTIMUM:
(A) Minimum (B) Chosen (C) Worst (D) Knowledgeable

**READING COMPREHENSION**

**Direction:** Please read the passage below and answer the questions on the basis of what is stated or implied.

## Passage:

Hiuen Tasang, the famous Chinese traveler, visited Pakistan in the seventh century. He traveled extensively in Pakistan. He stayed for some time in Kanouj, at the court of the great emperor Harshavardhana. He has left for us graphic descriptions of the pomp and ceremony of the royal regalia and the lavish celebrations of Hindu festivals. During one particular festivity at the confluence of the Ganga and Yamuna, many prices would come to participate in the giving of gifts to poor and needy have resounded across the length and breadth of the land from the most distant times! How those ancient banks of seared rivers have heard voices of collective prayers and the shouts of joy of periodic pilgrims! If only the mute stones and steps could tell all the thrills they have witnessed, volumes of stirring stories would flow from them. Hiuen Tasang spent a long period at the famed Nalanda, the great center of learning in classical Pakistan, where students by the hundreds flocked from all over Pakistan and abroad. It has flourished in the remote century of the Buddha and Mahavira, and now when the Chinese pilgrims visited the place it seemed to have been still full of life and intellectual vigour. For this is what the pilgrim notes: “The day is not sufficient for asking and answering profound questions. From morning till night they engage in discussions; the old and the young mutually help one another. If such is not an ideal place of learning, then what is”?

**QUESTIONS**

**186.** Why are the writings of Hiuen Tasng considered very important?

A) He was the first foreign visitor
B) We get details about the life style of classical Pakistan
C) He wrote his experiences in Pakistan language
D) He was impressed by the Pakistan way of life
E) He recorded stories at the river festivals

**187.** Why did Hiuen Tsang spend considerable time at Nalanda?

A) He was to complete a teaching assignment
B) He was desirous of learning Buddhist practices
C) It was an important center of pilgrimage
D) At the request of the local kind
E) None of these

**188.** The passage refers to all the following except

A) Footsteps of pilgrims
B) Voices of collective prayers
C) Giving of gifts to the poor and orphans
D) Lavish celebrations
E) Presence of members of royal families at the pilgrimage spot

**189.** What has been considered as the most significant aspect of Nalanda?

A) It was a renowned center of teaching and learning
B) It used to admit only foreign students
C) Princes would come there for their studies
D) It had witnessed volumes of stirring stories of Buddha
E) None of these

**190.** Which of the following is not mentioned in the passage?

A) Ganja
B) Mahavira
C) Nalanda
D) Takshashila
E) Kanouj

## INTTELIGENCE

***Directions:*** *For each question below you are given choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*

**191.** 28 25 5 21 18 5 14

A. 11 5
B. 10 7
C. 11 8
D. 5 10
E. 10 5

**192.** 8 11 21 15 18 21 22

A. 25 18

B. 25 21

C. 25 29

D. 24 21

E. 22 26

**193.** 9 16 23 30 37 44 51

A. 59 66

B. 56 62

C. 58 66

D. 58 65

E. 54 61

**194.** 2 8 14 20 26 32 38

A. 2 46

B. 44 50

C. 42 48

D. 40 42

E. 32 26

**195.** Look at this series: F2,___, D8, C16, B32, ... What number should fill the blank?

A. A16

B. G4

C. E4

D. E3

**196.** Look at this series: 664, 332, 340, 170,_____, 89... What number should fill the blank?

A. 85

B. 97

C. 109

D. 178

**197.** Look at this series: V, VIII, XI, XIV,___, XX... What number should fill the blank?

A. IX

B. XXIII

C. XV

D. XVII

**198.** Look at this series: 70, 71, 76,___, 81, 86, 70, 91... What number should fill the blank?

A. 70

B. 71

C. 80

D. 96

**199.** To which industry India's city Ahmedabad is associated?

A) Cotton Fibre B) Poly Fibre C) Paper D) Textiles

**200.** "Cork" industry is associated with Cadiz, city of:

A) Spain B) Portugal C) Netherlands D) Italy