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## NATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY (NUST)

### Computer Sciences Sample Admission Test 04

#### 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.

- The fifth term of the sequence  $a_n = 2n - 3$  is \_\_\_\_\_.
 

A) 13	B) -13
C) 7	D) -7
- The harmonic mean between a and b is
 

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

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- $\frac{8!}{6!} = \underline{\hspace{2cm}}$ .
 

A) 8	B) $\frac{1}{56}$
C) 56	D) None of these
- ${}^{16}C_{11} + {}^{16}C_{10} = \underline{\hspace{2cm}}$ .
 

A) ${}^{16}C_{10}$	B) ${}^{15}C_{11}$
C) ${}^{17}C_{10}$	D) ${}^{17}C_{11}$
- In the expansion of  $(a+x)^n$  the sum of exponents of a and x in each term of the expansion is



C)  $\pi$

D)  $2\pi$

12. Range of  $\tan x$  is \_\_\_\_\_.

A)  $\mathbb{R}$

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.  $r =$  radius of  $\triangle ABC$  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)  $\left\{\frac{\pi}{6} + n\pi\right\} \cup \left\{\frac{5\pi}{6} + n\pi\right\}, n \in \mathbb{Z}$

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

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

D) None of these

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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.  $\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx} = \underline{\hspace{2cm}}$ .
- A)  $1$
- B)  $\frac{b}{a}$
- C)  $\frac{a}{b}$
- D) None of these
21. If  $f(x) = \tan^{-1} x$  then  $f(\tan x) = \underline{\hspace{2cm}}$ .
- A)  $0$
- B)  $-1$
- C)  $1$
- D)  $2$
22.  $\frac{d}{dx} [\tan^{-1} x] = \underline{\hspace{2cm}}$ .
- A)  $\frac{1}{x\sqrt{x^2-1}}$
- B)  $\sec^2 x$
- C)  $\sin^2 x$
- D)  $\cos^2 x$
23.  $\frac{d}{dx} (\cosh 2x) = \underline{\hspace{2cm}}$ .
- A)  $2 \cosh 2x$
- B)  $-2 \sinh 2x$
- C)  $2 \sinh 2x$
- D)  $2 \coth 2x$
24. If  $f(x) = \tan^{-1} x$  then  $f(\tan x) = \underline{\hspace{2cm}}$ .
- 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.  $\int \frac{2x-1}{x^2-x+1} dx = \underline{\hspace{2cm}}$ .

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.  $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx = \underline{\hspace{2cm}}$ .

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.  $\int e^x \left[ \tanh^{-1} x + \frac{1}{1-x^2} \right] dx = \underline{\hspace{2cm}}$ .

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

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

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

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

29.  $\int_0^2 x^2 dx = \underline{\hspace{2cm}}$ .

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 (-3, 3) and 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)  $X = a$

C)  $Y = a$

B)  $Y = -a$

D)  $X = -a$

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

A)  $(\pm 3, 0)$

C)  $(0, \pm 2)$

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

D) None of these

33 The magnitude of the vector

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

A)  $A_1 + a_2 + a_3$

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

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

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

C) Parallel

B) Perpendicular

D) None of these

35

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

A)  $X = 2$

C)  $X = 14$

B)  $X = 11$

D)  $X = -33$

36  $\forall, a, b, c \in R, a = b \wedge b \Rightarrow a = c$  is

A) Reflexive property

C) Transitive property

B) Symmetric property

D) Additive property

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

A) 1

C) i

B) -1

D) -i



4. The rectangular components of a vector have angle between them  
 (a)  $0^\circ$                       (b)  $60^\circ$                       (c)  $90^\circ$                       (d)  $120^\circ$
5. A force of 10N is acting along y-axis. Its component along z-axis is  
 (a) 10N                      (b) 20N                      (c) 100N                      (d) Zero N
6. Two forces are acting together on an object. The magnitude of their resultant is minimum when the angle between the force is  
 (a)  $0^\circ$                       (b)  $60^\circ$                       (c)  $120^\circ$                       (d)  $180^\circ$
7. 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
8. 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

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9. 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
10. 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
11. 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  $60^\circ$



12. 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
13. The position vector of a point in xz-plane is given by  
 (a)  $\vec{r} = x \hat{i} + y \hat{j}$  (b)  $\vec{r} = y \hat{i} + z \hat{k}$  (c)  $\vec{r} = x \hat{i} + y \hat{j} + z \hat{k}$  (d)  $\vec{r} = x \hat{i} + z \hat{k}$
14. 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
15. 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

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16. if  $\hat{i}, \hat{j}, \hat{k}$  are unit vectors along x,y, and z-axes, the  $\hat{k} \times \hat{j} = \dots\dots\dots$   
 (a)  $\hat{i}$  (b)  $\hat{j}$  (c)  $-\hat{k}$  (d)  $-\hat{i}$
17. 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 ft per sec<sup>2</sup> B) 5 mi per hr per sec C) 5 mi per hr<sup>2</sup> D) 5 mi per sec<sup>2</sup>
18. 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 m B) 75 m C) 125 m D) 250 m

19. 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
20. 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
21. 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
22. 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
23. 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

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24. 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
25. The acceleration of a spherical ball on a smooth inclined plane is maximum when the angle of inclination to the horizontal is
- (a)  $90^\circ$       (b)  $60^\circ$       (c)  $30^\circ$       (d)  $0^\circ$

26. 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)  $1 \text{ kg m s}^{-2}$       (b)  $2 \text{ kg m s}^{-2}$       (c)  $4 \text{ kg m s}^{-2}$       (d)  $8 \text{ kg m s}^{-2}$
27. 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
28. 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
29. 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

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30. 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

## COMPUTER

**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 first high-level language to be introduced was  
 (a) COBOL

- (b) FORTRAN
- (c) Pascal
- (d) Assembly
- 2. Specifying the kind of input processing and output required for a program occurs when
  - (a) planning the solution
  - (b) flowchart the problem
  - (c) coding the problem
  - (d) defining the problem
- 3. After stating the solution to a problem in pseudo code, the next step would be
  - (a) testing the program
  - (b) coding the program
  - (c) documenting the program
  - (d) translating the program
- 4. Software that translates assembly language into machine language is
  - (a) a binary translator
  - (b) a compiler
  - (c) an assembler
  - (d) a link-loader
- 5. A standardized business language is
  - (a) PL/I
  - (b) BASIC
  - (c) COBOL
  - (d) FORTRAN

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- 6. Loading the operating system into a personal computer is called
  - (a) booting
  - (b) prompting
  - (c) interrupting
  - (d) paging
- 7. The time between the user's request and the computer's reply
  - (a) concurrent time
  - (b) response time
  - (c) allocation time
  - (d) event time
- 8. An on-screen picture:
  - (a) page
  - (b) NOC

- (c) Icon
- (d) Spool
- 9.** The set of choices on the screen is called
  - (a) menu
  - (b) editor
  - (c) reverse video
  - (d) template
- 10.** The feature that allows viewing any part of a document on the screen is
  - (a) searching
  - (b) pasting
  - (c) scrolling
  - (d) editing
- 11.** The command to transfer text to another location without deleting it from its original location is
  - (a) scroll
  - (b) copy
  - (c) search
  - (d) move
- 12.** Spelling checker programs
  - (a) tab settings
  - (b) pagination
  - (c) function keys
  - (d) a dictionary

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- 13.** Programs waiting to be run are kept on disk in
  - (a) page frames
  - (b) the background
  - (c) shells
  - (d) queues
- 14.** Prewritten standard file handling programs are called
  - (a) pull down menus
  - (b) pages
  - (c) supervisors
  - (d) utilities
- 15.** The signal that the computer is awaiting a command from the user
  - (a) prompt
  - (b) time slice
  - (c) event

(d) interrupt

## ENGLISH

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

### SENTENCE COMPLETION

#### Directions for Q 1 - 3

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.

- 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	
- There are too many \_\_\_\_\_ and not enough serious workers.
 

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

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### 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.

- CALLOW : MATURITY ::
  - incipient : fruition
  - spoiled : purity
  - young : old

- (d) eager : anxiety
5. CARELESSNESS : ACCIDENT ::  
 (a) assiduity : success  
 (b) indifference : fruition  
 (c) care : avoidance  
 (d) writer : blot
6. HYPOCHONDRIAC : HEALTH ::  
 (a) addict : drugs  
 (b) miser : money  
 (c) glutton : food  
 (d) narcotic : sickness
7. BRAKE : AUTOMOBILE ::  
 (a) choke : carburetor  
 (b) conscience : man  
 (c) detergent : society  
 (d) stop : horse

### 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.

8. PERT:  
 (A) Polite (B) Deliberate (C) Moral (D) Perishable
9. PRAISE:  
 (A) Reproof (B) Censure (C) Thymol (D) Trustworthy
10. PERTINENT:  
 (A) Puzzling (B) Discontented (D) Irrelevant (D) Understood

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### READING COMPREHENSION

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

#### **Passage:**

Hsuen Tsang, 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 princes 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

- 11 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
- 12 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
- 13 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
- 14 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
- 15 Which of the following is not mentioned in the passage?
- A) Ganja  
B) Mahavira  
C) Nalanda  
D) Takshashila  
E) Kanouj

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## END OF TEST

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