NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES (FAST)
Engineering Sample Admission Test 03

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. 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) $n \geq 2$

2. If sin θ is in
   - A) I and III quadrants
   - B) II and III quadrants
   - C) I and II quadrants
   - D) II and IV quadrants

3. If sin $\theta < 0$ then θ is in
   - A) I quadrant
   - B) II quadrant
   - C) III quadrant
   - D) IV quadrant

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4. $\mathrm{Sec}\left(a + \dfrac{\pi}{2}\right) = $.
   - A) Sec a
   - B) Cosec a
   - C) - sec a
   - D) - cosec a

5. 1- cos 2a =.
   - A) $2\sin^2 a$
   - B) $2\cos^2$
   - C) $2\sec a$
   - D) None of these

6. Period of sin $\dfrac{x}{3}$ is.
   - A) π
   - B) 3π
   - C) $\dfrac{2\pi}{3}$
   - D) 6π

7. The Period of 3 sin $\dfrac{x}{3}$ is.
   - A) π
   - B) 2π
   - C) 3π
   - D) 6π

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Page 1

8. $\text{Cos } \dfrac{a}{2} =.$

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

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

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

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

9. Area of Δ ABC = .

A) Ab sin a

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

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

D) $\dfrac{1}{2}$ ab sin β

10. The solution of the equation $1 + \cos x - 0$ is ------.

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

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

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

D) None of these

11. If f (x) – sex x then f $\left(\dfrac{\pi}{3}\right)$ is

A) 0

B) 1

C) 2

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

12. f (x)=C is

A) Identity function

B) Constant function

C) Linear function

D) Quadratic function

13. Cos h^2 x + sin h^2 x = --------.

A) Sin h 2x

B) - sin h 2x

C) Cos h 2x

D) - cos h 2x

14. $\lim\limits_{x \to 0} \dfrac{e^x - 1}{x} =$ ----------

A) e

B) 1

C) N a^{n-1}

D) Log$_e$ a

15. $\lim\limits_{x \to \theta} \dfrac{1 - \cos \theta}{\theta} =$ ----------

A) 0

B) 1

C) 2   D) Does not exite

16. If $f(x) = \dfrac{1}{x^2}$ then $f(x) = $ ---------.

A) $-2x^3$ B) $2x^{-3}$

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

17. Derivative of x^3 w.r.t.x^3 is

A) 0   B) 1

C) $3x^2$ D) x^3

18. $\dfrac{d}{dx(2^x)} = $ ....

A) 2^x B) 2^x Inx

    $2x$In2

C)   D) $\dfrac{2^x}{In2}$

19. If $f(x) = \cos x$ then $f(\tan x) = $ -----.

A) $-\dfrac{1}{1+x^2}$ B) $-\operatorname{cosec}^2 x$

C) Sec^{2x} D) $-\cos^2 x$

20. If $f(x) = \cos x$ then $f(0) = $ --------.

A) 0   B) 1

C) -1   D) None of these

21. $\displaystyle\int \dfrac{dx}{ax+b} = $ ....

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

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

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

D) $-\dfrac{1}{a} in|ax+b| + c$

22. $\displaystyle\int a^{\cos x} \operatorname{Sin} x \, dx = $ ....

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

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

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

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

23. $\int \dfrac{dx}{9+x^2} =.$

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

   C) $\dfrac{1}{3}\cos ec^{-1}\left(\dfrac{x}{3}\right)+c$ D) $\dfrac{1}{9}\tan^{-1}\left(\dfrac{x}{3}\right)+c$

24. $\int_0^{1/} \dfrac{dx}{\sqrt{1-x^2}} =.$

   A) $\dfrac{\pi}{6}$ B) $\dfrac{\pi}{3}$

   C) $\dfrac{\pi}{4}$ D)   - $\dfrac{\pi}{6}$

25. The distance between the pints (2,2) and (3,3) is
   A)   10   B) $\sqrt{2}$
   C)   5   D)   2

26. 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) $M_1 + m_2 = 0$

27. The equation of the line bisecting the first and third quadrants is
   A)   Y = x   B)   Y = -x
   C)   Y = a   D)   X = a

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

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

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

29. (1,2) is in the solution of the inequality
   A) $2x + y > 8$ B) $2x + y \leq 6$
   C) $2x - y > 1$ D) $2x + 3y < 2$

30. 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) $4x + 3y = 25$

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) $\left(\pm\sqrt{5,0}\right)$

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 $-\hat{i} + 4\hat{j} - x\hat{k}$ 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

BASIC MATH

1. $$\left(\frac{1}{5}\right)^2 - \left(\frac{1}{5}\right)\left(\frac{1}{4}\right) =$$

   A. $-\dfrac{1}{20}$ B. $-\dfrac{1}{100}$ C. $\dfrac{1}{100}$ D. $\dfrac{1}{20}$ E. $\dfrac{1}{5}$

2. A club collected exactly $599 from its members. If each member contributed at least $12, what is the greatest number of members the club could have?
      A. 43   B. 44   C. 49   D. 50   E. 51

3. A union contract specifies a 6 percent salary increase plus a $450 bonus for each employee. For a certain employee, this is equivalent to an 8 percent salary increase. What was this employee's salary before the new contract?
      A. $21,500   B. $22,500   C. $23,500   D. $24,300   E. $25,000

4. If n is a positive integer and $k + 2 = 3^n$, which of the following could NOT be a value of k?
      A. 1   B. 4   C. 7   D. 25   E. 79

5. Elena purchased brand X pens for $4.00 apiece and brand Y pens for $2.80 apiece. If Elena purchased a total of 12 of these pen for $42.00, how many brand X pens did she purchase?
      A. 4   B. 5   C. 6   D. 7   E. 8

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6. If the length and width of a rectangular garden plot were each increased by 20 percent, what would be the percent increase in the area of the plot?
      A. 20%   B. 24%   C. 36%   D. 40%   E. 44%

7. The population of a bacteria culture doubles every 2 minutes. Approximately how many minutes will it take for the population to grow from 1,000 to 500,000 bacteria?
      A. 10   B. 12   C. 14   D. 16   E. 18

8. When 10 is divided by the positive integer n, the remainder is $n - 4$. Which of the following could be the value of n?
      A. 3   B. 4   C. 7   D. 8   E. 12

9. For a light that has an intensity of 60 candles at its source, the intensity in candles, S, of the light at a point d feet from the source is given by the formula $S = \frac{60k}{d^2}$, where k is a constant. If the intensity of the light is 30 candles at a distance of 2 feet from the source, what is the intensity of the light at a distance of 20 feet from the source?

A. $\frac{3}{10}$ candle   B. $\frac{1}{2}$ candle   C. $1\frac{1}{3}$ candle   D. 2 candles   E. 3 candles

10.   If x and y are prime numbers, which of the following CANNOT be the sum of x and y?
A. 5   B. 9   C. 13   D. 16   E. 23

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.

1.   Value of Boltzman constant is
A) 1.38 JK^{-1} B) 1.38 x 10^{-23} JK^{-1}
C) 6.21 x 10^{-12} D) None

2.   Least distance of distinct vision in man is
A) 10 cm   B) 20 cm
C) 15 cm   D) 25 cm

3.   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°

4.   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

5.   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

6.   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

7.   When a projectile moves upwards, its vertical component of velocity
A) Remains constant   B) Decreases
C) Increases   D) Becomes equal to horizontal velocity

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

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Page 7

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

9. 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

10. 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

11. 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

12. 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

13. 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

14. If a force F moves a body with velocity V then power is
    A) $F \cdot V$
    B) $F \times V$
    C) $F + V$
    D) $F - V$

15. 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

16. 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

17. 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

18. 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

19. 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

20. At high velocity the motion of a fluid becomes
    A) Sreamed line
    B) Crcular
    C) Oscillatory
    D) Turbulent

ENGLISH
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.

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1. 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

2. Many educators argue that a_____ grouping of students would improve instruction because it would limit the range of student abilities in the classroom.
   A. heterogeneous
   B. Systematic
   C. homogeneous
   D. Sporadic
   E. Fragmentary

3. As news of his indictment spread through the town, the citizens began to____him and to avoid meeting him.
   A. ostracize
   B. Congratulate
   C. desecrate
   D. Minimize

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Page 9

E. Harass

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.

4. ASYLUM : SHELTER ::
   (a) harbor : concealment
   (b) palisade : display
   (c) stronghold : defense
   (d) hospice : exile
5. SCISSORS : SEVER ::
   (a) scales : average
   (b) barrel : roll
   (c) eraser : smudge
   (d) millstone : grind
   (e) match : strike
6. HONE : SHARP ::
   (a) polish : shiny
   (b) whet : blunt
   (c) memorize : minor
   (d) erode : moist
   (e) varnish : sticky

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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 <u>opposite</u> in meaning to the capitalized word.

7.   OWN:
   (A)   Outlay   (B)   Disclaim   (C)   Deny   (D)   Disobey
8.   PENCHANT:
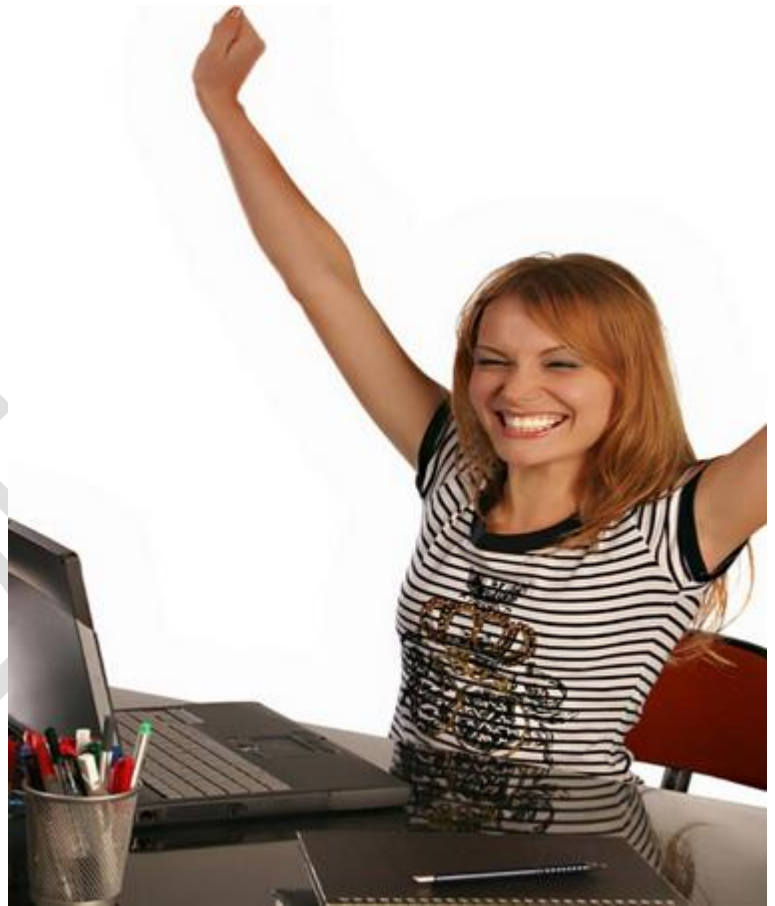   (A)   Dislike   (B)   Attitude   (C)   Imminence   (D)   Distance
9.   PROGRESS:
   (A)   Standard   (B)   Serious   (C)   Momentary   (D)   Interpretive
10.   PROGRESS::
   (A)   Recede   (B)   Retrogress   (C)   Prosperity   (D)   Shrike

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Page 10

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Page 11