





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

C)  $\pi$

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

D)  $2\pi$

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

A)  $\mathbb{R}$

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

B)  $[-1, 1]$

D) None of these

13.  $\sin \frac{a}{2} =$  \_\_\_\_\_ .

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

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

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

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

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14.  $r =$  radius of  $\Delta ABC$  is

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

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

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

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

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

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

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

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

D) None of these

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

A) 0

C) -1

B) 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)  $-1$

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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)  $2 \cos h 2x$   
 B)  $-2 \sin h 2x$



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

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33 The magnitude of the vector

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

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

- 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

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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)  $3 \times 1$   
 B)  $1 \times 3$   
 C)  $3 \times 3$   
 D)  $1 \times 1$

## GENERAL MATH

- Of the 3,600 employees of Company X,  $\frac{1}{3}$  are clerical. If the clerical staff were to be reduced by  $\frac{1}{3}$ , what percent of the total number of the remaining employees would then be clerical?  
 A. 25%      B. 22.2%      C. 20%      D. 12.5%      E. 11.1%
- In which of the following pairs are the two numbers reciprocals of each other?

- I. 3 and  $\frac{1}{3}$   
 II.  $\frac{1}{17}$  and  $\frac{-1}{17}$   
 III.  $\sqrt{3}$  and  $\frac{\sqrt{3}}{3}$
- A. I only      B. II only      C. I and II only      D. I and III      E. II and III
3. What is 45 percent of  $\frac{7}{12}$  of 240?  
 A. 63      B. 90      C. 108      D. 140      E. 311
4. If  $x$  books costs \$5 each and  $y$  books cost \$8 each, then the average (arithmetic mean) cost, in dollars per book, is equal to  
 A.  $\frac{5x+8y}{x+y}$       B.  $\frac{5x+8y}{xy}$       C.  $\frac{5x+8y}{13}$       D.  $\frac{40xy}{x+y}$       E.  $\frac{40xy}{13}$

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5. If  $\frac{1}{2}$  of the money in a certain trust fund was invested in stocks,  $\frac{1}{4}$  in bonds,  $\frac{1}{5}$  in a mutual fund, and the remaining \$10,000 in a government certificate, what was the total amount of the trust fund?  
 A. \$100,000      B. \$150,000      C. \$200,000      D. \$500,000      E. \$2,000,000
6. Marion rented a car for \$18.00 plus \$0.10 per mile driven. Craig rented a car for \$25.00 plus \$0.05 per mile driven. If each drove  $d$  miles and each was charged exactly the same amount for the rental, then equals  
 A. 100      B. 120      C. 135      D. 140      E. 150
7. Machine A produces bolts at a uniform rate of 120 every 40 seconds, and machine B produces bolts at a uniform rate of 100 every 20 seconds. If the two machines run simultaneously, how many seconds will it take for them to produce a total of 200 bolts?  
 A. 22      B. 25      C. 28      D. 32      E. 56



8.  $\frac{3.003}{2.002} =$
- A. 1.05                      B. 1.50015                      C. 1.501                      D. 1.5015                      E. 1.5
9. What is the decimal equivalent of  $\left(\frac{1}{5}\right)^5$ ?
- A. 0.00032                      B. 0.0016                      C. 0.00625                      D. 0.008                      E. 0.03125
10. Two hundred gallons of fuel oil are purchased at \$0.91 per gallon and are consumed at a rate of \$0.70 worth of fuel per hour. At this rate, how many hours are required to consume the 200 gallons of fuel oil?
- A. 140                      B. 220                      C. 260                      D. 322                      E. 330

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## 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. Which of the following is a scalar quantity
- (a) Density                      (b) Displacement                      (c) Torque                      (d) Weight
2. Which of the following is the only vector quantity
- (a) Temperature                      (b) Energy                      (c) Power                      (d) Momentum
3. 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
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

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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
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

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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

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

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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

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
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

## 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  
 C. professorial  
 E. Logical
- B. condescending  
 D. Justifiable
2. There are too many \_\_\_\_\_ and not enough serious workers.
- A. sycophants  
 C. novices  
 E. Zealots
- B. Kleptomaniacs  
 D. dilettantes
3. 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  
 C. indifference  
 E. Controversy
- B. Aesthetics  
 D. Significance

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## ANALOGY

**Direction:** Each question below consists of a related pair 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. CALLOW : MATURITY ::  
 (a) incipient : fruition  
 (b) spoiled : purity  
 (c) 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

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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 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 (C) Irrelevant (D) Understood

## 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 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  
 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  
 C) It was an important center of pilgrimage  
 E) None of these
- 13 The passage refers to all the following except  
 A) Footsteps of pilgrims  
 C) Giving of gifts to the poor and orphans  
 E) Presence of members of royal families at the pilgrimage spot
- D) He was impressed by the Pakistan way of life  
 B) He was desirous of learning Buddhist practices  
 D) At the request of the local kind  
 B) Voices of collective prayers  
 D) Lavish celebrations

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- 14 What has been considered as the most significant aspect of Nalanda?  
 A) It was a renowned center of teaching and learning  
 C) Princes would come there for their studies  
 E) None of these
- 15 Which of the following is not mentioned in the passage?  
 A) Ganja  
 C) Nalanda  
 E) Kanouj
- B) It used to admit only foreign students  
 D) It had witnessed volumes of stirring stories of Buddha  
 B) Mahavira  
 D) Takshashila



## END OF TEST

For Answer Key: [www.entrytest.com/testprep/answers.aspx](http://www.entrytest.com/testprep/answers.aspx)

