

Instructions

- All questions are compulsory.
- There's no negative marking
- There are three major sections in this paper - English, Mathematics, Science and IQ. Each question carries 1 mark.
- Please darken the most appropriate answer in the provided answer sheet.

Time: 1hour 30 Minutes.

The marks wise distribution of each of the section is as follows:

Section	Subject	Marks	Time [Suggested]
A	English	10	15 Minutes
B	Mathematics	20	30 Minutes
C	Science (Physics)	20	30 Minutes
D	IQ	10	15 Minutes

Section A– English

SENTENCE COMPLETION

1. Biological clocks are of such ____ adaptive value to living organisms, that we would expect most organisms to ____ them.
A. clear – avoid
B. meager – evolve
C. significant – eschew
D. obvious – possess

2. If there is nothing to absorb the energy of sound waves, they travel on _____, but their intensity _____ as they travel further from their source.
- A. erratically – mitigates
 - B. eternally – alleviates
 - C. indefinitely – diminishes
 - D. steadily – stabilizes
3. Each occupation has its own _____; bankers, lawyers and computer professionals, for example, all use among themselves language which outsiders have difficulty following.
- A. Merits
 - B. Disadvantages
 - C. Rewards
 - D. Jargon
4. The thief had managed to _____ on many occasions, but was finally _____ by the police and put behind the bars.
- A. cheat, robbed
 - B. abscond, kidnapped
 - C. deceive, cheated
 - D. escape, arrested
5. Every week, in the office, one hour is _____ to games and sports.
- A. Conferred
 - B. Dedicated
 - C. Conceded
 - D. Devoted

WORD ANALOGIES

6. EXTORT : OBTAIN ::
- A. pilfer : steal

- B. plagiarize : borrow
- C. explode : ignite
- D. purify : strain

7. MEDICINE : ILLNESS :

- A. law : anarchy
- B. hunger : thirst
- C. etiquette : discipline
- D. love : treason

8. diamond : baseball :: court : _____

- A. poker
- B. jury
- C. grass
- D. squash

9. poetry : rhyme :: philosophy : _____

- A. imagery
- B. music
- C. bi-law
- D. theory

10. skew : gloomy :: slant : _____

- A. glee
- B. foible
- C. desperate
- D. gloaming

Section B– Mathematics

1. If $A = \{x : x^2 - 4x + 3 = 0, x \in \mathbb{N}\}$, $B = \{x : -2 \leq x - 3 \leq 0, x \in \mathbb{N}\}$ and $C = \{3, 4\}$, then $(A \cap B) \times (B \cap C)$ is ;
 - A. $\{(3, 1), (3, 3)\}$
 - B. $\{(1, 3), (3, 3)\}$
 - C. $\{\}$
 - D. $\{3\}$
2. Find the range of the function $y = \frac{|x+100|}{x+100}$;
 - A. $\mathbb{R} - \{-100\}$
 - B. $(-1, 1)$
 - C. $\{-1, 1\}$
 - D. $\mathbb{R} - \{100\}$
3. If quantity $A = (1+2+3)$ and quantity $B = 1 + 2 + 3$ then which of the following relation is true ;
 - A. $A = B$
 - B. $A < B$
 - C. $A > B$
 - D. $A \neq B$
4. If $A = \begin{bmatrix} 0 & 1 & -1 & 0 \end{bmatrix}$ then $A^{101} = ?$;
 - A. $\begin{bmatrix} 0 & 1 & -1 & 0 \end{bmatrix}$
 - B. $\begin{bmatrix} 0 & 101 & -101 & 0 \end{bmatrix}$
 - C. $\begin{bmatrix} 1 & 0 & 0 & 1 \end{bmatrix}$
 - D. $-\begin{bmatrix} 0 & 1 & -1 & 0 \end{bmatrix}$
5. Which one of the following is the quadratic equation, one of whose root is $1 - i$;
 - A. $x^2 + 2x - 2 = 0$
 - B. $x^2 - 2x + 1 = 0$
 - C. $x^2 - 2x + 1 = 0$
 - D. $x^2 - 2x + 2 = 0$

6. For what value of r the equation $2x^2+6x+3r=0$ will have reciprocal roots;
- A. $\frac{2}{3}$
 - B. 3
 - C. 2
 - D. $\frac{3}{2}$
7. Which of the following triplets are not the sides of a right angled triangle;
- A. 3, 4, 5
 - B. 1, 1, $\sqrt{3}$
 - C. 1, $\sqrt{3}$, 2
 - D. 30, 40, 50
8. For what value of p the line $4x-3y+p=0$ is a tangent to the circle $x^2+y^2-8x+12y+3=0$;
- A. 32 or -18
 - B. 3 or -1
 - C. -6 or 0
 - D. 1 or -69
9. If the difference of mode and median of a data is 24, then the difference of median and mean is;
- A. 36
 - B. 24
 - C. 12
 - D. 8
10. Which of the following is example of first degree homogenous equation;
- A. $ax^2+bx+c=0$
 - B. $ax^2+bxy=0$
 - C. $ax+by+c=0$
 - D. $ax+by=0$

11. If focus (2,0) and vertex is at (1,2) then equation of parabola is;

- A. $y^2-8x+4y+12=0$
- B. $y^2-8x-4y-12=0$
- C. $y^2-8x-4y+12=0$
- D. $y^2+8x+4y+12=0$

12. For what value of p the length of the tangent $x^2+y^2+2py=0$ from (5,4) is unity;

- A. 5
- B. $\sqrt{5}$
- C. -5
- D. 15

13. If $y = e^{3x+7}$, then the value of $\frac{dy}{dx}$ at $x=0$ is;

- A. e^0
- B. 0
- C. -1
- D. $3e^7$

14. What is $\int_0^2 \frac{dx}{x^2+4}$ equal to?

- A. $\frac{\pi}{2}$
- B. $\frac{\pi}{4}$
- C. $\frac{\pi}{8}$
- D. None of these

15. If the pair of equations $2x+3y=5$ and $10x+15y=2a$ has infinitely many solutions, then $a = ?$

- A. $\frac{-5}{2}$
- B. $\frac{25}{2}$
- C. $\frac{-25}{2}$

D. $\frac{5}{2}$

16. How many iterations do you need to get the root of a function if you start with $a = 2$ and $b = 3$ and tolerance is 10^{-4} ?

- A. 10
- B. 12
- C. 14
- D. None of these

17. Identify the correct approximated value of $\int_0^{\pi} (3\cos x + 1)dx$, $n=3$ by trapezoidal rule;

- A. 3.1416
- B. 3.01416
- C. 3.4146
- D. 3.6164

18. Two unbiased dice are thrown. The probability that neither a doublet nor a total of 10 will appear is;

- A. $\frac{7}{9}$
- B. $\frac{5}{7}$
- C. $\frac{3}{5}$
- D. $\frac{2}{7}$

19. What is the general solution of, $\tan \beta + \tan 3\beta = 2\tan 2\beta$;

- A. $2n\pi \pm \frac{\pi}{4}$
- B. $n\pi + \frac{\pi}{4}$
- C. $n\pi$
- D. $n\pi - \frac{\pi}{4}$

20. If $0 < x < 1$ which of the following lists the numbers in increasing order?

- A. \sqrt{x}, x, x^2

- B. x, x^2, \sqrt{x}
- C. x^2, x, \sqrt{x}
- D. x^2, \sqrt{x}, x

Section C– Physics

1. In the equation $[p + \frac{a}{b}](V - b) = RT$, Pressure = P, Volume = V, Absolute Temperature = T, Universal molar gas constant = R. The dimensional formula of constant 'a' is
 - A. $ML^2 T^{-3}$
 - B. $ML^5 T^{-2}$
 - C. L^3
 - D. $ML^{-1} T^{-2}$

2. When a body rolls down an inclined plane, the total potential energy of the body changes into
 - A. Rotational KE
 - B. Translation KE
 - C. Both rotational and translational KE
 - D. None

3. The length of the simple pendulum is increased by 44 %. What is the percentage increase in its period?
 - A. 5 %
 - B. 10 %
 - C. 20 %
 - D. 44 %

4. In laminar flow, the velocity of flow at any point in the liquid is
 - A. does not vary with time
 - B. may vary in magnitude but not in the direction
 - C. may vary in direction but not in magnitude
 - D. may vary both in magnitude and direction

5. At what depth, the value of 'g' is the same as that of 'g' at a height of 10 km?
- A. 20 KM
 - B. 10 KM
 - C. 40 KM
 - D. 80 KM
6. The absolute zero is the temperature at which
- A. water freezes
 - B. substances exist in solid state
 - C. molecular motion stops
 - D. none of them
7. The door of a refrigerator is kept open. Which of the following is true?
- A. Room is cooled
 - B. Room is heated
 - C. Room is neither cooled nor heated
 - D. Room will be cooled in summer and heated in winter
8. The angle of deviation when passing through a prism is greater for light
- A. Red
 - B. Blue
 - C. Yellow
 - D. Violet
9. In refraction, light waves are bent on passing from one medium to the second medium, because in the second medium
- A. the frequency is different
 - B. the coefficient of elasticity is different
 - C. the speed is different
 - D. the speed is not different

10. A listener is moving away from a stationary source of the sound. The listener hears a sound of frequency

- A. higher than the source frequency
- B. lower than the source frequency
- C. same as that of source frequency
- D. none of them

11. Which of the following correctly shows regions of the electromagnetic spectrum in order of increasing wavelength?

- A. gamma < infrared < visible < radio wave
- B. microwave < ultraviolet < visible < infrared
- C. radio < ultraviolet < infrared < microwave
- D. ultraviolet < visible < infrared < microwave

12. The plane at which the earth's magnetic field is horizontal is

- A. Plane through the magnetic meridian
- B. Plane through magnetic equator
- C. Plane through magnetic poles
- D. It is not a horizontal plane

13. In AC motor, the capacitor is used to

- A. decrease AC
- B. decrease DC
- C. increase AC
- D. reduce ripples

14. When mercury is cooled to 4 K, it behaves as

- A. Semiconductor
- B. Superconductor
- C. Insulator

D. Conductor

15. The penetrating power in the decreasing order is

A. $\alpha < \beta < \gamma$

B. $\alpha > \beta > \gamma$

C. $\alpha < \gamma < \beta$

D. $\alpha > \gamma > \beta$

16. What is de-Broglie wavelength of electron having energy 10 keV?

A. 0.12 \AA

B. 1.2 \AA

C. 12.2 \AA

D. none of these

17. Neutrino is a particle that has

A. spin and charge less

B. spin and charge as an electron

C. no spin and charge less

D. no spin but charge like electrons

18. The induction coil works on the principle of

A. Self – induction

B. Mutual induction

C. Ampere's rule

D. Fleming's right hand rule

19. Diameter of a Nichrome wire is reduced to half. Now its real resistance increases

A. 2 times

B. 4 times

C. 8 times

D. 16 times

20. The capacitance of the earth of radius 6400 KM is

- A. 711 F
- B. 711 μF
- C. 711 mF
- D. $711 \times 10^{-5} \mu\text{F}$

Section D– IQ

1. In January, the value of a stock increased by 25%, and in February, it decreased by 20%. How did the value of the stock at the end of February compare with its value at the beginning of January?

- A. It was less
- B. It was the same
- C. It was 5% greater
- D. It was more than 5% greater

2. Hari, Kiran and Ganesh have a total of Rs. 390. Hari has 5 times as much as Ganesh, and Kiran has $\frac{3}{4}$ as much as Hari. How much money does Kiran have?

- A. 40
- B. 78
- C. 150
- D. 200

3. 7952 : 1211 : 23 Which set of numbers below has the same relationship to each other as the numbers above?

- A. 3482 : 2408 : 16
- B. 3496 : 1254 : 39
- C. 8278 : 1510 : 25
- D. 8217 : 9090 : 99

4. 100, 99.8, 99.2, ? , 92, 75.8 What number should replace the question mark?



5. What is the number of triangles in the figure given below?



- A. 26
- B. 28
- C. 30
- D. 32

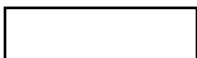
6. After covering Five-eighth of my Journey, I find that I have travelled 60 km. How much Journey is left?

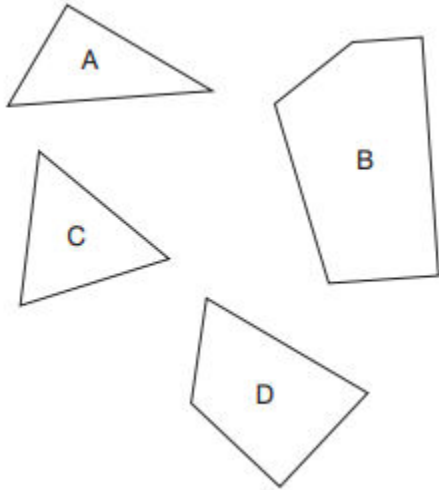
- A. 40
- B. 80
- C. 36
- D. 27

7. Five Boys A, B, C, D and E are sitting in a park in a circle. A is facing South-west, D is facing South-East, B and E are right opposite A and D respectively and C is equidistant between D and B. Which direction is C facing?

- A. West
- B. South
- C. North
- D. East

8. Which three pieces below can be fitted together to form a perfect square?





9. HILT is to LMPY as DENS is to ????

10. If BIRD is written as 2-9-18-4, then how is CROW written in that code?

A. 3-17-26-22

B. 3-18-15-23

C. 3-19-16-24

D. 3-18-16-23

End of Test.

Answer Keys

English

1. D	2. C	3. C	4. D	5. D
6. D	7. A	8. D	9. D	10. C

Mathematics

1. B	2. C	3. A	4. D	5. D
6. A	7. B	8. D	9. C	10. D
11. C	12. C	13. D	14. C	15. B
16. C	17. B	18. C	19. C	20. C

Physics

1. B	2. A	3. C	4. D	5. D
6. A	7. B	8. D	9. C	10. D
11. C	12. C	13. D	14. C	15. B
16. C	17. B	18. C	19. C	20. C

IQ

1. B	2. C	3. C	4. 97.4	5. B
6. C	7. D	8. ABD	9. HIRX	10. B