Section-I: General Ability

1. If a man buys 5 liters of milk at Rs 18/- per liter. He mixes it with 20% water and sells it at Rs 20/- per liter, then what is the percentage gain?

(A) 22% (B) 33.3% (C) 40% (D) 60%

2. If the probability of win on any given match for India is 50 percent, what is the probability that it wins exactly 2 out of 5 matches?

(A) 8/125 (B) 2/25 (C) 5/16 (D) 8/25

3. A card is drawn from a pack of 52 cards. The probability of getting a double face card is

(A) $\frac{3}{26}$ (B) $\frac{1}{26}$ (C) $\frac{2}{13}$ (D) $\frac{3}{13}$

4. GVK Energy recently reported 2nd quarter earnings. The analyst consensus estimate for 2nd quarter earnings per share was a 20% increase over last year's 2nd quarter earnings per share. If the company actually reported earnings per share that were 30% lower than analyst estimates, by what percent did this year's 2nd quarter earnings per share decrease over last year's 2nd quarter earnings per share?

(A) 12% (B) 10% (C) 15% (D) 16%

5. If difference between SI and CI over an amount borrowed @ 8% per annum for 2 years is 8/-, then the principal amount is _____.

(A) 800/- (B) 100/- (C) 1200/- (D) 1250/-

6. Two trains are moving in the same direction at 70 kmph and 43 kmph respectively. A man in the slower train observes the 10 seconds elapse before the faster train completely passes by him. What is the length of faster train?

(A) 100m (B) 75m (C) 120m (D) 50m

7. In a School consisting 350 students, each student is registered for at least one of three classes - Dance, Music and Kungfu. 150 students are registered for Dance, 150 students are registered for Music, and 200 students are registered for Kungfu. If only 50 students are registered for all three classes, how many students are registered for exactly two classes?

(A) 200 (B) 100 (C) 50 (D) 150

8. The price of onions increases by 25%, by what percent should a housewife reduces the consumption so that expenditure on onions can be same as before?

(A) 15% (B) 16.66% (C) 12% (D) 20%

9. In how many ways can 2 children be seated in a row of 'n' chairs, so that there is always at least one empty chair between the two?

(A) n (B) n^2+n (C) n^2-3n (D) n^2-3n+2

10. I was 4ft tall in 1990 and my height increased a constant amount each year for the next 5 years. At the end of the 5th year, I was 1/6 taller than I was at the end of the 3th year. By how many feet did my height increase per year?
(A) 3/10 (B) 4/15 (C) 1/2 (D) 2/3

11. Choose the correct option, which is the closest opposite in meaning to the word **Pliant**
(A) Humble (B) Rigid (C) Tactful (D) Earnest

12. Choose the pair that best expresses a relationship similar to that expressed by the original pair.
Inflate: Magnitude
(A) Measure: Weight (B) Extend: Duration
(C) Magnify: Coin (D) Legislate: Crime

13. Choose the most appropriate alternative from the options given below to complete the sentence.
You are as tall as _____
(A) me (B) I (C) mine (D) I am

14. Choose the grammatically incorrect sentence.
(A) We understand his having to leave early
(B) Susan regrets John's being in trouble
(C) You should not rely on him calling you in the morning
(D) They are looking forward to our visiting them

15. Complete the sentence:
Hot milk has long been a standard cure for insomnia because of its _____ quality.
(A) malevolent (B) desultory (C) soporific (D) plaintive

16. Researchers have found that since the oil price increase of the 1990's, there has been a decline in home energy consumption. They concluded that almost all of the decline has been achieved through reduced standards of living and changes in the way people spend their time.
Each of the following, if true, would support the conclusion above EXCEPT:
(A) Sales of portable heaters rose as families concentrated their winter activities in a limited number of rooms.
(B) During the winter months, more people frequented public places such as libraries and community centers, and on the average, spent considerably longer periods in them than they had done previously.
(C) More than 39 percent of households were able to decrease energy costs substantially by having relatively inexpensive work done to improve the efficiency of their existing heating systems.
(D) At least 59% of the households maintained a lower indoor temperature than they had been accustomed to maintaining on very cold days.

17. Which of the following, if true, is the most logical completion of the argument below?

Companies defend their established practices and products, and resist change even if the market forces demand such change. When consumers insist on newer technologies and products, some companies respond to this demand by offering the same old-technology products with improved cosmetics. This rear-guard action is exemplified by_____

(A) An automobile manufacturer offering a new line of hybrid cars running on electricity and conventional fuel to meet the growing demand for fuel-efficient cars.
(B) A manufacturer of analog mobile phones offering a set of designer face plates on their analog phones in the face of a growing demand for digital mobile phones.
(C) Analog phones in the face of a growing demand for digital mobile phones.
(D) A computer manufacturer offering free office suite with every computer purchased.

18. Choose the part that contains error.

We think / her as / a / silly girl /
(A) (B) (C) (D)

19. "The reservation system in Indian railways should be abolished".

Choose the argument irrelevant to the above statement:

(A) The income of railway reduces
(B) It reduces the economical barriers between have's and have-not's
(C) The reservation compartments need to be modified
(D) The general ticket counters will get rushed

20. You mustn't _____ children for the mistakes of their parents.

(A) Reproach (B) Reprieve (C) Repeal (D) Reject

Section-II: Mathematics, Chemistry, Physics

1. $Z = \cos\theta + i\,[2\sin\theta - \sqrt{3}]$, where z is purely real, the general solution is _____ .

(A) $\frac{\pi}{16}$ (B) $n\pi + (-1)^n \frac{\pi}{6}$

(C) $(2n+1)\frac{\pi}{2} + (-1)^n \frac{\pi}{3}$ (D) $n\pi + (-1)^n \frac{\pi}{3}$

2. For a laser light show at an amusement park, the laser beam directed from the top of a 25ft building is to reflect from an object that is 90ft away from the base of the building at a point directly below the location of the laser. What is the angle of depression from the laser to the reflecting object?

(A) 15^o (B) 20^o (C) 25^o (D) 30^o

3. Find coefficient of x^{50} in

$(1+x)^{1000} + x(1+x)^{999} + x^2(1+x)^{998} + ... + x^{1000}$

(A) $1000C_{50}$ (B) $1001C_{50}$ (C) $1000C_{51}$ (D) $1001C_{51}$

4. If $\tan x = \frac{b}{a}$ then the value of acos2x+bsin2x is

(A) 1 (B) ab (C) b (D) a

5. If $\sin A = \frac{1}{\sqrt{10}}$ and $\sin B = \frac{1}{\sqrt{5}}$ where A and B are acute angles then (A+B) is _____.

(A) π (B) $\pi/2$ (C) $\pi/3$ (D) $\pi/4$

6. The pair of straight lines $6x^2 + 13xy + 6y^2 + x + 4y - 2 = 0$ meet the coordinate axes at P, Q, R, S. Then the equation of the circle passing through these points is ____ .

(A) $6x^2 + 6y^2 + x - 4y - 2 = 0$ (B) $6x^2 + 6y^2 - x + 4y - z = 0$

(C) $6x^2 + 6y^2 - x - 4y - 2 = 0$ (D) $6x^2 + 6y^2 + x + 4y - 2 = 0$

7. The length of the tangent from the point $(-2,-1)$ drawn to a circle passing through the origin is 2 units and a diameter of the circle contains the equation $x - y = 3.5$ then the centre of the circle is

(A) $(1, 2.5)$ (B) $(-1,-2.5)$ (C) $(-1, 2.5)$ (D) $(1,-2.5)$

8. In the system of linear equations AX=B, if rank [A] < rank [A:B], then
(Where A is a square matrix, unknown X and B are column vectors and [A:B] is the augmented matrix.)

(A) there is only a trivial solution (B) there is a unique solution
(C) there are infinitely many solutions (D) there is no solution

9. The number of ways in which 4 boys and 4 girls can be seated around a round table such that no two boys are adjacent is _____

(A) 130 (B) 156 (C)144 (D) 162

10. Consider a set $A = \{1,2,3,4,5,6,7,8,9,10\}$. A binary relation R on A is defined as aRb, iff $(a-b) \bmod 10 = 0$; then which of the following statements are true?

1. R is reflexive
2. R is anti-symmetric
3. R is symmetric
4. R is transitive

(A) 1, 2 (B) 1, 3 (C) 1, 3, 4 (D) 1, 2, 3, 4

11. An electron in Bohr's H-atom has energy of -3.4eV. What is the angular, momentum of the electron?

(A) 2.5×10^{-34} JS (B) 2.9×10^{-25} JS (C) 2.6×10^{-34} JS (D) 2.11×10^{-34} JS

12. How many orbitals are there in the shell with n = 3?

(A) 9 (B) 16 (C) 8 (D) 2

13. Which of the following compounds is expected to be coloured?

(A) Ag_2So_4 (B) CuF_2 (C) MgF_2 (D) Cucl

14. The rate of diffusion of methane at a given temperature is twice that of X. The molecular mass of X is

(A) 64.0 (B) 32.0 (C) 4.0 (D) 8.0

15. An element has an atomic number 9 and mass number 19 respectively. Its ion is represented by

(A) M^+ (B) M^{2+} (C) M^- (D) M^{2-}

16. Electron sea model explains the presence of

(A) Freely moving electrons
(B) Freely moving protons
(C) Freely moving metal ions
(D) A definite geometrical arrangement of metal atoms

17. Among the following reactions Entropy decrease is maximum in

$(A)\ NH_3(g) + HCl(g) \rightarrow NH_4Cl(S)$

$(B)\ NaoH(aq) + HCl(aq) \rightarrow Nacl(aq) + H_2O$

$(C)\ CaCO_3(S) \rightarrow Cao(S) + Co_2(g)$

(A) B (B) A (C) C (D) All are Equal

18. Cloud bursts happen due to

(A) Dense clouds are present in the upper atmosphere
(B) Mutual discharge of oppositely charged clouds resulting in the coagulation
(C) Large amount of water is present in the cloud
(D) The clouds are attracted towards the electrical charge on the earth

19. Metal ions exhibits colours when they are ignited due to

(A) Metal deficiency defect (B) Frenkel defect
(C) Schottley defect (D) Metal excess defect

20. HX is a weak acid ($k_a = 10^{-5}$). It forms a salt NaX (0.1M) on reacting with caustic soda. The degree of hydrolysis of NaX is

(A) 0.01% (B) 0.0001% (C) 0.1% (D) 0.5%

21. Which of the following does not have relation with the first law of thermodynamics?

(A) Work (B) Heat (C) Internal energy (D) Entropy

22. Which of the following electromagnetic radiation has the longest wavelength?

(A) β-rays (B) γ- rays (C) X-rays (D) α-rays

23. A photon energy corresponding to the red light of maximum wavelength is approximately equal to

(A) 1.5 eV (B) 1.0 eV (C) 2.5 Ev (D) 2.0 eV

24. Two unknown particles of mass M and 4M have kinetic energies in the ratio of 2: 1. What is the ratio of their linear momenta?

(A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{4}$ (D) $\frac{1}{16}$

25. A satellite is revolving around the earth in a circular orbit of radius *R*. Its period of revolution varies as

(A) $\sqrt{R}$ (B) R (C) $R^{\frac{3}{2}}$ (D) R^2

26. In a npn transistor circuit connected in common emitter mode, the collector current is 40 mA and the base current is 1 mA. The current gain β is

(A) $\frac{41}{40}$ (B) $\frac{39}{40}$ (C) $\frac{40}{41}$ (D) $\frac{39}{41}$

27. Consider silicon and copper materials at room temperature, if these materials are cooled from room temperature to 75 K. The resistance of

(A) silicon and copper materials increases

(B) silicon and copper materials decreases

(C) copper increases and that of silicon decreases

(D) copper decreases and that of silicon increases

28. Which of the following gates are the basic building blocks in digital circuits?

(A) AND and OR gates (B) NOT and AND gates

(C) NOT and OR gates (D) NOR and NAND gates

29. A diatomic molecule, each of mass M, separated by a distance *R*. The moment of inertia of the diatomic molecule about its centre of mass is

(A) $2MR^2$ (B) MR^2 (C) $\frac{1}{2}MR^2$ (D) $\frac{1}{4}MR^2$

30. A wave in a stretched string at time‘t’ is described by the equation $y = A\sin 2\pi\left(\frac{x}{\lambda} - \frac{t}{T}\right)$.

The maximum particle velocity is

(A) $\frac{\omega}{k}$ (B) $\frac{d\omega}{dk}$ (C) $\frac{x}{t}$ (D) $A\omega$