Choose the one lettered choice that is best in each case and then fill in the corresponding circle in the answer sheet provided.

Each question carries equal mark. Time: 2hrs

F.M. 1x100=100

Chemistry

1. If you titrate 1M H_2SO_4 solution against 50ml of 1M NaOH solution, what volume of H_2SO_4, in milliliters, will be needed for neutralization?

   a. 25 b. 10 c. 75 d. 2

2. Which of the following pair of compounds can be used to illustrate the law of Multiple Proportions?

   a. NO &NO_2 b. ZnO_2&$ZnCl_2$ c. H_2O&HCl d. CH_4&CO_2

3. 4grams of hydrogen are ignited with 4 grams of oxygen. How many grams of water can be formed?

   a. 0.5 b. 4.5 c. 2.5 d. 36

4. If 49 grams of H_2SO_4 react with 80 grams of NaOH, how much reactant will be left over after the reaction is complete?

   a. 40 grams of NaOH b. 24.5grams of H_2SO_4

   c. 20grams of NaOH d. None of either compound

5. Which of the following atom normally forms monoatomic molecule?

   a. Oxygen b. Hydrogen c. Nitrogen d. Helium

6. What is the approximate pH of a 0.005M solution of H_2SO_4 ?

   a. 5 b. 1 c. 2 d. 13

7. The atomic structure of the alkane series contains the hybrid orbitals designated as

   a. sp^2 b. sp^3 c. sp d. sp^3d^2

8. How many atoms are represented in the formula $Ca_3(PO4)_2$?

   a. 5 b. 13 c. 8 d. 9

9. An ester can be prepared by the reaction of

   a. an alcohol and an organic acid b. an organic acid and an aldehyde

   c. two alcohols d. an acid and a ketone

10. The most active non metallic element is

    a. Chlorine b. Fluorine c. Nitrogen d. Oxygen

11. The shape of a PCl_3 molecule is described as

a. trigonal planar b. bent c. linear d. trigonal pyramidal

12. Aluminium is extracted from its oxide by

a. Electrolysis b. Roasting c. Reduction with carbon d. Smelting

13. What is the pH of a solution with a hydroxide ion concentration of 0.00001mole/liter?

a. 14 b. -1 c. 9 d. -5

14. Which reagent is used to detect the presence of double bond in a given organic compound?

a. Fehling's solution b. Tollen's reagent c. Bayer's reagent d. Benedict reagent

15. Which element in the periodic table has highest Electron Affinity value?

a. Fluorine b. Chlorine c. Aluminium d. Iodine

English

16. We don't understand why they object ……..with us.

a. his coming

b. to him coming

c. to his coming

d. both a. and c.

17. …….love I have for my country is unimaginable.

a. The

b. An

c. A

d. None

18. Unless you <u>grease his palm</u>, he will not listen to you.

a. flatter him
b. abuse him
c. beat him
d. bribe him

19. She is quite thirsty. She wants to ……..her thirst.

a. mollify

b. slake

c. pacify

d. satisfy

20. Which of the following is a complex sentence?

a. I know the right method of doing the problem.

b. He went out to buy a newspaper.

c. This is the man who stole the money.

d. My friend gave me the book but I lost that.

21. They live on a busy road. ……a lot of noise from the traffic.

a. It must be

b. There must be

c. There must have

d. It must have

22. Are you looking forward to……Victor again?

a. seeing

b. to see

c. be seen

d. to be seeing

23. This old man is too weak to walk.

This old man……

a. is so weak that he cannot walk
b. is weak enough to walk
c. is enough weak to walk
d. is such weak that he cannot walk.

24. An abnormal dread of being shut up in a small room

a. claustrophobia b. photophobia
c. zoophobia d. acrophobia

25. Everybody has his coat brushed,……..?

a. do they b. doesn't he

c. does he d. don't they

26. She is unhappy and.....

a. so am not I b. I do too

c. so am I d. I am either

27. A lady was carrying a ……..bag.

a. black small plastic b. small and black plastic

c. small black plastic d. plastic small black

28. It took us quite a long time to get here. It was ……journey.

a. three hour b. a three- hour

c. a three- hours d. the three hours

29. The word *vegetation* receives stress on it's…….. syllable.

a. 1st b. 2nd

c. 3rd d. 4th

30. Manju resembles ……..her mother.

a. to b. with

c. in d. no preposition

Read the following passage and choose the correct answer

Although speech is the most advanced form of communication, there are many ways of communicating without using speech. Signals, signs, symbols and gestures may be found in every known culture. The basic function of a signal is to impinge upon the environment in such a way that it attracts attention, as for example, the dots and dashes of a telegraph circuit. Coded to refer to speech, the potential for communication is very great. Less adaptable to the codification of words, signs also contain meaning in and of themselves. A stop sign or a barber pole conveys meaning quickly and conveniently. Symbols are more difficult to describe than either signals or signs because of their intricate relationship with the receiver's cultural perceptions. In some cultures, applauding in a theatre provides performers with an auditory symbol of approval. Gestures such as waiving and handshaking also communicate certain cultural messages.

Although signals, signs, symbols and gestures are very useful, they do not have major disadvantage. They usually do not allow ideas to be shared without the sender being directly adjacent to the receiver. As a result, means of communication intended to be used for long distance and extended periods are based upon speech. Radio, television and the telephone are only a few.

31. What does the author say about speech?

a. It is the only true form of communication.

b. It is dependent upon the advances made by inventors.

c. It is necessary for communication to occur.

d. It is the most advanced form of communication.

32. According to the passage, what is a signal?

a. The most form of communication to describe.

b. A form of communication which may be used across long distance.

c. A form of communication that intrudes the environment.

d. The form of communication most intrudes the environment

33. The phrase "impinge on" in the third sentence is closest in meaning to

a. intrude b. improve

c. vary d. prohibit

34. Why were the telephone, radio, and TV invented?

a. People were unable to understand signs, symbols, and signals.

b. People wanted to communicate across long distance.

c. People believed that signs, signals and symbols were obsolete.

d. People wanted new forms of sentences.

35. It may be concluded from this passage that……..

a. signals, signs, symbols, and gestures are forms of communication.

b. symbols are very easy to define and interpret.

c. only some cultures have signal, symbols and signs.

d. waving and handshaking are not related to culture.

Mathematics

36. If A and B are two sets in the same universal set, then A - (A – B) is

a. empty set b. B – A c. B d. $A \cap B$

37. If f(x) = 5x – 2 is defined for all x , then $f^{-1}(x)$ is

a. (x+ 2)/5 b. 1/(5x-2) c. 2x-5 d. $\frac{1}{5x}-\frac{1}{2}$

38. If f(x) = x + 1 and g(x) = x^3 are defined for all x then, (fog)(x) is

a. $(x+1)^3$ b. $x^3 + x$ c. $x^4 + x$ d. $x^3 + 1$

39. If $|x-1|<2$, x takes all values in the interval

a. [- 1, 2] b. [- 1, 3] c. (-1, 3) d. (-1, 2)

40. The domain of the real valued function $f(x) = \sqrt{4-x^2}$ is

(a) $[-2,2]$ (b) (-2, 2) (c) $[0,2]$ (d) $[-2,0]$

41. The value of $\lim_{x\to 0} x\sin\frac{1}{x}$ is

a. 1 b. 0 c. does not exist d. $\frac{\pi}{2}$

42. The value of $\lim_{x\to\infty}\frac{2x^2+1}{4x^2-3x+6}$ is equal to

a. -2/3 b. 1/2 c. -1/2 d. 1/6

43. If.x = a cos nt + b sin nt, then $\frac{d^2x}{dt^2}$ is equal to

a) - n^2x b) n^2x c) – nx d) nx

44. If y= $\cot^{-1}$x, then dy/dx is equal to

a. -1/1+x^2 b. 1/1+x^2 c. $\frac{1}{\sqrt{1+x^2}}$ d. $-\frac{1}{\sqrt{1+x^2}}$

45. $\frac{d}{dx}(x\log x)$ is

a. 1 b. logx+1 c. $\frac{1}{x}$ d. $x^2\log x$

46. If the function $f(x)=\begin{cases}5x-4 & for\ 0<x\leq 1\\ x^2+bx & for\ 1<x<2\end{cases}$ is continuous at x = 1 then b is equal to

a. 1 b. -1 c. 0 d $\frac{5}{4}$

47. If $tan\theta=\sqrt{3}$ and $cos\theta=-\frac{1}{2}$ then θ lies in

a.IV quadrant b. II quadrant c. I quadrant d. III quadrant

48. If $\log_a \sqrt{5} = \frac{1}{2}$ then the value of a is

a. 1 b. 5 c. $\sqrt{\frac{5}{2}}$ d. $\frac{\sqrt{5}}{2}$

49. The maximum value of f(x) = sin x + cos x is

a. 1/2 b. 2 c. $\sqrt{2}$ d. $1/\sqrt{2}$

50. What comes after 56 in the sequence 2, 12, 30, 56 …..

a. 90 b. 80 c. 88 d. 78

51. If $f(x) = x^4 - 3x^2+2x -1$ is divided by x-1 then the remainder is

a. 2 b. 0 c. 1 d. -1

52. The length of perpendicular from (1, 0) upon -3x+4y+5 = 0 is

a. 3/5 b. 2/5 c. 4/5 d. 0

53. The equation of the line through (0, 0) and perpendicular to 4x +5y+6 = 0 is

a. 5x – 4y = 0 b. 5x+4y = 0 c. 4x - 5y = 0 d. 4x+5y = 0

54. The radius of the circle $x^2+y^2-4x+6y -12= 0$ is

a. 4 b. 6 c. 12. d. 5

55. The polar co-ordinate of the point (1, 1) is,

a $\left(\sqrt{2}, \frac{\pi}{4}\right)$ b. $\left(2, \frac{\pi}{4}\right)$ c. $\left(0, \frac{\pi}{2}\right)$ d. $\left(\sqrt{2}, \frac{\pi}{2}\right)$

56. (5, 9), (-4, 1) are two vertices of a triangle whose centroid is at (1,1) then the third vertex is

a (4,2) b.(3,-1) c. (2,-7) d. (6,3)

57. If the lines x – y = 0, x + y = 2 and 2x - y = k are concurrent, the value of k is

a. -1 b. 2 c. 0 d. 1

58. In any triangle ABC, cos A/2 is equal to

a. $\sqrt{\frac{s(s-a)}{bc}}$ b. $\sqrt{\frac{(s-b)(s-c)}{bc}}$ c. $\frac{b^2+c^2-a^2}{2a}$ d. $\sqrt{\frac{s(s-a)}{abc}}$

59. If f(x) is strictly decreasing in [a,b], then its derivative in (a, b) is

a. zero b.positive c. negative d. somewhere +ve and somewhere –ve

60. The value of $\int \log x dx$ is

a. $x(\log x - 1)$ b. x logx c. 1/x d. $(\log x)^2/2$

61. $\int \cot^2 x \, dx$ is

a. 2cotx b. $\cot^3 x/3$ c. -cosecx - c d. -cot x - x

62. $\int \sin^2 x dx$ is

a. $\cos^2 x$ b. $x/2 - \sin 2x/4$ c. $2\sin x \cos x$ d. $\sin^3 x/3$

63. $\sin^{-1}(4/5)$ is equal to

a. $\cos^{-1}(3/5)$ b. $\tan^{-1}(3/4)$ c. $\cot^{-1}(4/5)$ d. $\sec^{-1}(3/5)$

64. If roots of quadratic equation $x^2+kx - 4 = 0$ are equal but opposite in sign, then

a. $k = 1$ b. $k = 4$ c. $k = 0$ d. $k = -4$

65. If the roots of the equation $x^2+6x+k = 0$ are equal, then the value of k is

a. 9 b. 6 c. -6 d. 0

66. If $z = \frac{1}{2+3i}$, then the real part of z is

a. 2 b. 2/13 c. -2/13 d. 3/13

67. The polar form of $z = 1+i$ is

a. $\sqrt{2}\left(\cos\frac{\pi}{4} - i\sin\frac{\pi}{4}\right)$ b. $\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$ c. $2\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

d. $\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

68. If the matrix $\begin{bmatrix} 0 & 0 & k \\ 1 & 2 & 5 \\ 1 & 3 & 9 \end{bmatrix}$ is singular then the value of k is

a. 2 b. 0 c. 1 d. 5

69. Two straight lines represented by $ax^2+2hxy+by^2=0$ are same to each other if

a. $a+b = 0$ b. $a = b$ c. $h^2 = - ab$ d. $h^2 = ab$

70. In any triangle ABC, cos B is equal to

a. $\frac{a^2+c^2-b^2}{2ac}$ b. $\frac{a^2+c^2-b^2}{ac}$ c. $\frac{a^2+c^2-b^2}{2b}$ d. $\sqrt{\frac{s(s-b)}{ac}}$

71. If $\cos x = ½$, then the general value of x is

a. $n\pi \pm \pi/3$ b. $2n\pi \pm \pi/3$ c. $n\pi/2 \pm \pi/3$ d. $n\pi + (-1)^n \pi/3$

72. The area bounded by $y = x^2$, x axis and $x = 1$ between $x = 0$ and $x = 1$ is

a. 1 b. 1/4 c. 2/3 d. 1/3

73. If $3\sin^{-1}x + \cos^{-1}x = \pi$, then the value of x is

a. $\frac{1}{\sqrt{2}}$ b. $-\frac{1}{\sqrt{2}}$ c. 0 d. 1

74. If $x = 3$ is a root of $x^2 - 7x + k = 0$, then the value of k is

a. 1 b. -7 c. 12 d. 3

75. The value of $(\cos 15^{o} + i \sin 15^{o})^{6}$ is

a. 1 b. i c. -i d. -1

Physics

76. A lens of power -4D is placed in contact with a lens of power +2D.The power of lens combination will be
a. -6D
b. +2D
c. -2D
d. -1D
77. If the normal reaction is doubled, keeping limiting friction same, the coefficient of friction is
a. not changed
b. halved
c. doubled
d. tripled
78. The amount of heat required to change the state of 1kg of substance at constant temperature is called
a. Kilocal
b. Calorie
c. Specific heat
d. Latent heat
79. Mechanical waves can be
a. longitudinal only
b. transverse only
c. both longitudinal and transverse
d. neither longitudinal nor transverse
80. The bending of light waves through the corners of the obstacle is called
a. refraction
b. diffraction
c. interference
d. beats
81. Critical angle is that angle of incidence in the denser medium for which the angle of the refraction in rarer medium is
a. 0^{o}
b. 57^{o}
c. 90^{o}
d. 180^{o}
82. The splitting of white light into several colours on passing through a glass prism is due to
a. reflection
b. refraction
c. interference
d. diffraction
83. Three capacitors each of capacitance 3μF are connected in parallel. The net capacitance is
a. 1/3 μF

b. 3μF
c. 1μF
d. 3μF

84. The magnetic field strength at point 'P' with distance 'r' from a long straight wire carrying current 'I' is
a. $\frac{\mu o I}{2r}$
b. $\frac{\mu o I}{2\pi r}$
c. $\frac{\mu o I}{4\pi r}$
d. $\frac{\mu o I}{\pi r}$

85. The moment of a photon of wavelength λ is
a. hλ b. λ/h c. h/λ d. h/cλ

86. Which of the following has highest elasticity?
a. Steel b. Rubber c. Copper d. Aluminium

87. The C.G.S unit of coefficient of viscosity is
a. Poise b. kg/m.s c. Newton d. g.sec/cm

88. The mirror suitable for saving is
a. Plane
b. Concave
c. Convex
d. may be plane or convex

89. The number of electrons in one coulomb of charge will be
a. $5.46X10^{29}$
b. $6.25X10^{18}$
c. $1.6X10^{19}$
d. $6.02X10^{23}$

90. 1 Kilowatt hour is equal to
a. $3.6X10^{6}$ J
b. $3.6X10^{4}$ J
c. 10^{3} J
d. $6X10^{4}$ J

91. A neutron enters in a magnetic field of strength B tesla perpendicular to the magnetic lines of force with speed v, the force on the neutron is
a. evB
b. zero
c. infinity
d. evB/2

92. The most penetrating radiation of the following is

a. Gamma Ray

b. Alpha particles

c. Beta rays

d. X-rays

93. Which planet is farthest to Sun?

a. Saturn
b. Uranus
c. Neptune
d. Pluto

94. When DC-current (I) is passed through an inductance L, the energy stored is

a. zero

b. LI

c. $1/2\ LI^2$

d. $L^2/2I$

95. Which one of the following is a form of energy

a. pressure b. momentum c. light d. power

96. The size of atom is nearly equal to

a. 1nm b. 1 micron c. $1\ A^o$ d. 1 fermi

97. The energy of an X –ray photon is 2Kev. The frequency of X-ray in Hz is

a. $5X10^{17}$ b. $3.2X10^{16}$ c. $2X10^{19}$

d. $2X10^{18}$

98. The minimum distance between an object and its real image formed by a thin convex lens of focal length 'f' is

a. 4f b. 2f c. f d. f/2

99. The force between two electrons separated by a distance 'r' varies as

a. r2 b. r c. 1/r d. $1/r^2$

100. The magnetic force 'F' on a current 'i' carrying conductor of length 'l' placed in a magnetic field 'B' at an angle 'θ' with its direction is

a. BilSin θ b. Bilcos θ c. Biltan θ d. Bil