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Model Question Paper ATIT

INSTRUCTIONS

1. There are 120 questions in The Admission Test for IcfaiUniversity Technology (ATIT) 2013, and the allotted time ~~120~~ minutes.

Section	Subject	No. of Questions	Time
I	English	30 (1-30)	30 Minutes
II	Mathematics	30 (31-60)	30 Minutes
III	Physics	30 (61-90)	30 Minutes
IV	Chemistry	30 (91-120)	30 Minutes
Total		120	120 Minutes

2. Each question has four options (a, b, c and d). The candidates are required to choose the correct option.
3. Usage of any type of calculators and cell phones is strictly prohibited.
4. Any kind of malpractice will disqualify the candidate from ATIT.

Section I

Subject	:	ENGLISH
Time	:	30 Minutes
Questions	:	30 (Serial No. 01-30)

Section I

English

- I. *Directions: In the following questions, each word is followed by four options. Choose the option which is the closest synonym of the given words. While choosing your answer, keep in mind the finer distinctions in the meaning and usage of certain words.*

1. IDIOSYNCRASY

- (a) Disgrace (b) Esteem (c) Eccentricity (d) Rebellion

2. APLOMB

- (a) Composure (b) Aspiration (c) Fluency (d) Revolt

3. MUTILATE

- (a) Injure (b) Contaminate (c) Mollify (d) Reconcile

4. CEREMONIOUS

- (a) Peccable (b) Floppy (c) Pompous (d) Lavish

5. DESPOTIC

- (a) Outspoken (b) Simple (c) Quick (d) Tyrannical

6. WOE

- (a) Bliss (b) Sadness (c) Patience (d) Knowledge

- II. *Directions: In the following questions, each word is followed by four options. Choose the option which is the closest antonym of the given words. While choosing your answer, keep in mind the finer distinctions in the meaning and usage of certain words.*

7. BANALITY

- (a) Originality (b) Preciseness (c) Specialty (d) Selfishness

8. CURRENCY

- (a) Bankruptcy (b) Insolvency (c) Obsolescence (d) Complacence

9. FIASCO

- (a) Fun (b) Success (c) Disparity (d) Succession

10. FICTITIOUS

- (a) Natural (b) Real (c) Inferior (d) Blunt

11. LAMENT

- (a) Spin (b) Defeat (c) Rejoice (d) Suppress

12. QUASH

- (a) Postpone (b) Equate (c) Support (d) Validate

III. *Directions: Complete the following sentences by selecting a suitable word from the given options.*

13. Money is not like cars or cups of tea, because one cannot test-drive or _____ it.
(a) Taste (b) Boil (c) Heat (d) Inhale
14. Nehru stressed the need for 'self discipline, hard work and team spirit' among the people for _____ of the national development of socialistic pattern of society.
(a) Suppression (b) Expression (c) Fulfillment (d) Symbolism
15. For millions of patients with terminal illnesses, pain is an everyday _____.
(a) Reality (b) Surety (c) Frequency (d) Supposition
16. If emotions and feelings are not permitted as inputs in the thinking process, they will _____ in the background and affect all the thinking in a hidden way.
(a) Shroud (b) Lurk (c) Fulminate (d) Prowl

IV. *Directions: Four alternatives are provided for each of the following questions. Select the most acceptable and appropriate of the four options. In considering the alternatives, pay close attention to grammar as well as clarity and precision.*

17. (a) Patients should not fly if they should have a heart attack in the past two weeks.
(b) Patients should not fly if they might have a heart attack in the past two weeks.
(c) Patients should not fly if they could have had a heart attack in the past two weeks.
(d) Patients should not fly if they have had a heart attack in the past two weeks.
18. (a) Nearly a quarter of the world's land mammal species are at a risk through extinction.
(b) Nearly a quarter of the world's land mammal species are at a risk of extinction.
(c) Nearly a quarter of the world's land mammal species are at a risk with extinction.
(d) Nearly a quarter of the world's land mammal species are at a risk for extinction.
19. (a) The more carbohydrates we eat the more efficiently our body uses them.
(b) The more carbohydrates we eat the most efficiently our body uses them.
(c) The more carbohydrates we eat more efficiently our body uses them.
(d) More carbohydrates we eat the more efficiently our body uses them.
20. (a) Americans love the idea of that democracy should look like and argue all the time about what democracy is.
(b) Americans love the idea of democracy and democracy should look like and argue all the time about what it has to be.
(c) That Americans love the idea of democracy and argue all the time about what that democracy should look like.
(d) Americans love the idea of democracy and argue all the time about what that democracy should look like.

V. *Directions: In the following questions, each sentence is divided into three parts (a), (b) and (c). Find out which part of the sentence contains an error. If there is no error, mark your answer as (d).*

21. The drama had /so many humorous scenes /
 (a) (b)
 that it was hard possible to keep a straight face.No error
 (c) (d)
22. Despite their best efforts,/they could not convince/
 (a) (b)
 the members by changing their decision.No error
 (c) (d)
23. Teachers today are increasingly afraid /for being victimized /
 (a) (b)
 by laws that protect the children.No error
 (c) (d)
24. Scarcely had the game started /then the rain /came pouring down. No error
 (a) (b) (c) (d)
25. By the time /he had won his commission, the senior officer/
 (a) (b)
 had start seeking employment elsewhere.No error
 (c) (d)

VI. *Directions: The given passage is followed by questions based on its content. Read the passage and choose the best answer.*

The control of fire was the first and perhaps the greatest of humanity's step towards a life-enhancing technology. To early man, fire was a divine gift randomly delivered in the form of lightning, forest fire or burning lava. Unable to make flame for themselves, the earliest people probably stored fire by keeping slow-burning logs alight or by carrying charcoal in parts.

How and where man learnt how to produce flame at will is unknown. It was probably a secondary invention, accidentally made during tool-making operations with wood or stone. Studies of primitive societies suggest that the earliest method of making fire was through friction.

European

peasants would insert a wooden drill in a round hole and rotate it briskly between their palms. This process could be speeded up by wrapping a cord around the drill and pulling on each end.

The ancient Greeks used lenses or concave mirrors to concentrate the sun's rays and burning glasses were also used by Mexican Aztecs and the Chinese. Percussion methods of fire lighting date to Paleolithic times, when the Stone Age toolmakers discovered that chipping flints produced sparks. The technique became more efficient after the discovery of iron, about five thousand years ago.

In Arctic North America, the Eskimos produced a slow-burning spark by striking quartz against iron pyrites, a compound that contains sulphur. The Chinese lit fire by striking porcelain with bamboo. In Europe, the combination of steel, flint and tinder remained the main method of fire-

lighting until the mid-nineteenth century.

26. According to the passage, what was the first and the greatest of humanity's step towards a life-enhancing technology?
- (a) Making of fire (b) The control of fire
(c) Invention of tools (d) The discovery of iron
27. How did the primitive societies view fire?
- (a) As a lightning (b) As a blessing
(c) As a heavenly gift (d) As a burning lava
28. It is estimated that the earliest method of making fire was through
- (a) Rotation (b) Drilling (c) Chipping (d) Friction
29. Which of the following statements is true according to the passage?
- (a) Bamboo cannot be used for producing fire
(b) The Chinese produced fire by striking porcelain with bamboo
(c) Eskimos produced fire with bamboo
(d) The original method of making fire was through drilling
30. Choose the synonym of 'primitive' as used in the passage.
- (a) Ancient (b) Expensive (c) Innovative (d) Perilous

END OF SECTION I

Section II

Subject : MATHEMATICS
Time : 30 Minutes
Questions : 30 (Serial No. 31-60)

Section II

Mathematics

Directions: Each question given below has a problem and four alternatives. You have to choose the best answer from the alternatives (a), (b), (c) and (d).

31. The domain of the function $f(x) = \frac{1}{1+x^2}$ is
 (a) $\{x \mid x < 1\}$ (b) $\{x \mid x > -1\}$ (c) $[0, 1]$ (d) $[-1, 1]$
32. If a set A has m elements and B has n elements, then the number of functions from A to B is
 (a) nm (b) 2mn (c) mn (d) $2m+n$
33. Let $A = \{f\}$ and $B = P(P(A))$, the power set of the power set of A. Then B is
 (a) f (b) $\{f\}$ (c) $\{\{f\}\}$ (d) None of these
34. If w is a non real cube root of unity, then the expression $(1+w)^3$ is equal to
 (a) 0 (b) 3 (c) 1 (d) 2
35. The number of integral solutions of $x^2 + 1 > \frac{1}{2}$ is
 (a) 4 (b) 5 (c) 3 (d) Infinite
36. For any $m \times n$ matrix A and a fixed k, if a matrix K satisfies $KA = kA$, then K is a
 (a) Transpose of A (b) Diagonal matrix
 (c) Symmetric matrix (d) Skew Symmetric matrix
37. The system of equations $2x - y + z = 0$; $x - 2y + z = 0$; $lx - y + 2z = 0$ has infinite number of nontrivial solutions if l is
 (a) 1 (b) 5 (c) -5 (d) 2
38. The sum of two non integral roots of $\begin{vmatrix} x & 2 & 5 \\ 3 & x & 3 \\ 5 & 4 & x \end{vmatrix} = 0$ is
 (a) 5 (b) -5 (c) -18 (d) 16
39. ABCD is a convex quadrilateral. 3, 4, 5 and 6 points are marked on the sides AB, BC, CD and DA respectively. The number of triangles with vertices on different sides is
 (a) 270 (b) 220 (c) 282 (d) 342

40. The term independent of a in the expansion of $(1 + a + \frac{1}{a})^{30}$ is
 (a) $30C_{20}$ (b) 0 (c) $30C_{10}$ (d) $20C_{10}$
41. The minimum of $4x + 41|x|$, $x \in \mathbb{R}$, is
 (a) 2 (b) 4 (c) 1 (d) 8
42. Let $f(n) = \int_0^n [x] dx$ where $[x]$ denotes the integral part of x . Then value of $f(100)$ is
 (a) 50 (b) 51 (c) 1 (d) 25
43. The last term in the binomial expansion of $(\frac{1}{2} + \frac{1}{x})^{38}$ is $\frac{1}{2^{38}} \cdot \frac{1}{x^0} \cdot 38C_0$. Then the 5th term from the beginning is
 (a) $10C_6$ (b) $2 \cdot 10C_4$ (c) $\frac{110}{2} \cdot C_4$ (d) $5C^4$
44. The number of real solutions of the equation $\log_{0.5} x = x$ is
 (a) 1 (b) 2 (c) 0 (d) 3
45. The number of values of ' a ' for which $(a^2 + 3a + 2)x^2 + (a^2 + 5a + 6)x + 2$ is an identity in x is
 (a) 0 (b) 2 (c) 1 (d) 3
46. If x, y, z are real and distinct, then $f(x, y, z) = x^2 + 4y^2 + 9z^2 - 6yz - 3zx - 2xy$ is always
 (a) Non-negative (b) Non-positive (c) Zero (d) Complex
47. The common root(s) of the equations $x^3 + 2x^2 + 2x + 1 = 0$ and $1 + x^{130} + x^{1988} = 0$ (where w is a non real cube root of unity) is/are
 (a) w and w^2 (b) w^3 (c) -1 (d) w^2
48. $\lim_{x \rightarrow 0} \frac{\int_0^{x^2} \cos t^2 dt}{x \sin x}$ is
 (a) 1 (b) 2 (c) 0 (d) ∞
49. If $[.]$ denotes the greatest integer function, then $\lim_{n \rightarrow \infty} \frac{[x] + [2x] + \dots + [nx]}{n^2}$
 (a) 0 (b) x (c) $x/2$ (d) x^2

50. Let $f(t) = \int_0^x t \sin t \, dt$. Then the number of points of discontinuity of the function f in the open interval $(0, \pi)$ is
- (a) 0 (b) 1 (c) 2 (d) Infinite
51. If $\int_0^x f(t) dt = x + \int_0^1 f(t) dt$, then the value $f(1)$ is
- (a) $1/2$ (b) 0 (c) 1 (d) $1/4$
52. The area of the region bounded by the pair of lines $y = |x - 1|$ and $y = 3 - |x|$ is
- (a) 3 unit² (b) 4 unit² (c) 6 unit² (d) 2 unit²
53. $\int \frac{1+x^2}{x^3} dx$ is equal to
- (a) $\frac{2}{3} (1+x^2)^{3/2} + C$ (b) $\frac{2}{3} (1-x^2)^{3/2}$ (c) $\frac{2}{3} x (1+x^2)^{3/2}$ (d) $\frac{2}{3} \frac{1}{(1-x^2)^{3/2}} + C$
54. Let $f(x) = \begin{cases} x e^{\frac{1}{x}} + \frac{1}{x} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$, then $f(x)$ is
- (a) Continuous for all x but not differentiable at $x = 0$
 (b) Neither differentiable nor continuous at $x = 0$
 (c) Discontinuous everywhere
 (d) Continuous and differentiable for all x
55. The polar coordinates of the vertices of a triangle are $(0, 0)$, $(3, \pi/2)$ and $(3, \pi/6)$. Then the triangle is
- (a) Right angled (b) Isosceles
 (c) Equilateral (d) Right-angled isosceles
56. If the point (a, a) falls between the lines $|x + y| = 2$, then
- (a) $|a| = 2$ (b) $|a| = 1$ (c) $|a| < 1$ (d) $|a| < 0.5$
57. The circle $x^2 + y^2 + 2\lambda x = 0$, $\lambda \in \mathbb{R}$, touches the parabola $y^2 = 4x$ externally. Then
- (a) $\lambda > 0$ (b) $\lambda < 0$ (c) $\lambda > 1$ (d) $\lambda < 1$
58. The number of integral values of λ for which $x^2 + y^2 + \lambda x + (1-\lambda)y + 5 = 0$ is the equation of a circle whose radius cannot exceed 5, is
- (a) 14 (b) 18 (c) 16 (d) 12

59. The image of the origin in the line $\frac{x+1}{2} = \frac{y-1}{3} = \frac{z}{3}$ is

- (a) $\frac{1}{2}, \frac{11}{2}, \frac{3}{2}$ (b) $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$ (c) $\frac{3}{2}, \frac{5}{2}, \frac{3}{2}$ (d) $\frac{1}{2}, \frac{11}{2}, \frac{3}{2}$

60. The shortest distance between the lines $x - y = 0 = 2x + z$ and $x + y - 2 = 0 = 3x - y + z - 1$ is

- (a) $\frac{1}{2}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\frac{1}{2}$ (d) 1

Section III

Subject : PHYSICS
Time : 30 Minutes
Questions : 30 (Serial No.61 - 90)

Section III

Physics

Directions Each question given below has four alternatives. You have to choose the best answer from the alternatives (a), (b), (c) and (d).

61. A vernier caliper has 20 divisions on the vernier scale which coincide with 19 on the main scale. The leastcount of the instrument is 0.1 mm. The main scale divisions are of length equal to
 (a) 0.5 mm (b) 1 mm (c) 2 mm (d) 0.25 mm
62. A boy throws up balls in the air in such a way that when the first ball is at its maximum height, he throws the second ball. If the balls are thrown with a time difference of 1 second, then the height attained by the balls is
 (a) 19.6 m (b) 9.8 m (c) 4.9 m (d) 2.45 m
63. One of the rectangular components of a velocity of 100 km h^{-1} is 503 km h^{-1} . The other rectangular component is
 (a) 503 km h^{-1} (b) 50 km h^{-1} (c) 502 km h^{-1} (d) 25 km h^{-1}
64. In a game of tug of war, two opposing teams are pulling the rope with equal but opposite forces of 1000 N at each end of the rope so that a condition of equilibrium exists. What is the tension in the rope?
 (a) 2000 N (b) 1000 N (c) Zero (d) 6400 N
65. A thin circular ring of mass M and radius R is rotating about its central axis with angular velocity ω . Four point objects each of mass m are attached gently to the opposite ends of the two perpendicular diameters; the angular velocity of the ring now is
 (a) $\frac{M}{M+m} \omega$ (b) $\frac{M}{M+4m} \omega$ (c) $\frac{M+4m}{M} \omega$ (d) $\frac{M!4m}{M+4m} \omega$
66. A body is thrown up from the surface of the earth with a velocity equal to $\frac{3}{4}$ of the escape velocity. Assume that the radius of the earth is R , the height attained by the body is
 (a) $\frac{19R}{20}$ (b) $\frac{9R}{7}$ (c) $\frac{7R}{9}$ (d) $\frac{11R}{7}$
67. The binding energy of a hydrogen molecule is 4.75 eV. The energy required to dissociate 0.05% of hydrogen gas at NTP occupying a volume of 5.6 litres is approximately
 (a) 20 J (b) 30 J (c) 40 J (d) 60 J
68. A particle oscillates such that its motion is represented by $a = -kx$, where 'a' is the acceleration, 'x' is displacement and 'k' a constant. The period of oscillation is
 (a) $2\pi \sqrt{\frac{1}{k}}$ (b) $2\pi \sqrt{\frac{1}{k}}$ (c) $2\pi \sqrt{\frac{1}{k}}$ (d) $2\pi \sqrt{\frac{1}{k}}$

69. Two identical samples of a gas expand so that the volume is doubled. The first sample undergoes an isothermal expansion while the second is expanded adiabatically. The final pressure
- (a) In the first sample is greater (b) In the second sample is greater
(c) Is equal in both the samples (d) Cannot be determined
70. The radiation emitted by a perfectly black body is proportional to
- (a) Temperature on ideal gas scale
(b) Fourth root of temperature on Kelvin's scale
(c) Fourth power of temperature on Kelvin's scale
(d) Square of temperature on Kelvin's scale
71. Charge of $+q$, $2q$, $+q$ and $-q$ are placed in the corners of a square. Calculate the electric field at the intersection of the diagonals of the square when q is $5/3 \times 10^{-9}$ C and each side is 10 cm.
- (a) $2.1 \times 10^3 \text{ Vm}^{-1}$ (b) $9.1 \times 10^{-2} \text{ Vm}^{-1}$ (c) $1.8 \times 10^4 \text{ Vm}^{-1}$ (d) $0.9 \times 10^4 \text{ Vm}^{-1}$
72. The resistance of a wire is R ohm. What will be the new resistance if it is stretched uniformly to n times its original length?
- (a) nR (b) $\frac{R}{n}$ (c) n^2R (d) $\frac{R}{n^2}$
73. Three identical charges each of $+q$ are placed at the corners of an equilateral triangle of side d cm. The force on a positive charge $+2q$ at the centroid of the triangle will be
- (a) Zero (b) $\frac{3q}{4\pi\epsilon_0 d^2}$ (c) $\frac{7q}{4\pi\epsilon_0 d^2}$ (d) $\frac{9q}{4\pi\epsilon_0 d^2}$
74. A parallel plate capacitor is filled with a dielectric whose dielectric constant is 5 and has a dielectric strength of $20 \times 10^6 \text{ Vm}^{-1}$. If the capacitance of this capacitor is $8.0 \times 10^{-2} \text{ F}$ and if it can withstand a potential difference of 5000 V, the minimum plate area of the capacitor is
- (a) 0.45 m^2 (b) 0.62 m^2 (c) 0.54 m^2 (d) 0.24 m^2
75. Four wires each of resistance 1 ohm are connected in the form of a square. The equivalent resistance of the square when current enters at one corner and leaves at a diagonally opposite corner will be
- (a) 1Ω (b) 2Ω (c) 4Ω (d) 8Ω
76. A certain compact disc player draws a current of 350 mA at 6.0 V. The power required to operate the player in watts is
- (a) 2.1 (b) 58.3 (c) 122.5 (d) 150.0
77. Interference fringes from sodium light ($\lambda = 5890 \text{ \AA}$) in a double slit experiment have an angular width of 0.20° . To increase the fringe width by 10%, new wavelength should be
- (a) 5896 \AA (b) 7321 \AA (c) 6300 \AA (d) 6479 \AA
78. The radius of curvature of convex surface of a thin planoconvex lens is 15 cm and the refractive index of its material is 1.6. The power of the lens will be
- (a) $+1 \text{ D}$ (b) -2 D (c) $+3 \text{ D}$ (d) $+4 \text{ D}$

79. The work function of aluminum is 4.2 eV. If two photons each of energy 3.5 eV strike an electron of aluminum, then emission of photoelectron
 (a) Will be possible (b) Depends on the smoothness of the surface
 (c) Will not be possible (d) Both (a) and (b)
80. If E is the kinetic energy and m the mass of a moving particle with velocity v , the De-Broglie wavelength associated with the particle is
 (a) $2mEv$ (b) $\frac{h\nu}{E}$ (c) $\frac{hEv}{2m}$ (d) $\frac{h}{2mE}$
81. Monochromatic light of wavelength 3000 \AA is incident on a surface of area 4 cm^2 . If the intensity of light is 150 m W/m^2 , then the rate at which photons strike the target is
 (a) $3 \times 10^{10} \text{ s}^{-1}$ (b) $3 \times 10^{13} \text{ s}^{-1}$ (c) $7 \times 10^{15} \text{ s}^{-1}$ (d) $6 \times 10^{19} \text{ s}^{-1}$
82. Half-life of a radioactive material is 1 day. If the starting material has a mass of 16 mg, the amount of material that will remain after 4 days is
 (a) 12 mg (b) 8 mg (c) 4 mg (d) 1 mg
83. Nuclear reactor in which Uranium-235 is used as fuel, uses 2 kg of Uranium-235 in 30 days. Then the power output of the reactor will be (given that the energy released per fission is 185 MeV)
 (a) 43.5 MW (b) 58.5 MW (c) 69.6 MW (d) 73.1 MeV
84. When a P-N junction is forward biased, potential barrier
 (a) Decreases (b) Increases
 (c) Remains constant (d) Cannot be determined
85. An electric current is passed through a circuit containing two wires of the same material, connected in parallel. If the lengths and radii of the wires are in the ratio of $4/3$ and $2/3$, then the ratio of the currents passing through the wires will be
 (a) 3 (b) $1/3$ (c) $8/9$ (d) 2
86. The resistance of the series combination of two resistances is S . When they are joined in parallel, the total resistance is P . If $S = nP$, then the minimum possible value of n is
 (a) 4 (b) 3 (c) 2 (d) 1
87. In an LCR circuit, capacitance is changed from C to $2C$. For the resonant frequency to remain unchanged, the inductance should be changed from L to
 (a) $4L$ (b) $2L$ (c) $L/2$ (d) $L/4$
88. A metal conductor of length 1 m rotates vertically about one of its ends at angular velocity 5 radians per second. If the horizontal component of the earth's magnetic field is $0.2 \times 10^{-4} \text{ T}$, then the emf developed between the two ends of the conductor is
 (a) 5 μV (b) 50 V (c) 5 mV (d) 50 mV
89. The time period of a satellite of the earth is 5 hours. If the separation between the earth and the satellite is increased to 4 times the previous value, the new time period will become
 (a) 20 hours (b) 10 hours (c) 80 hours (d) 40 hours

90. Consider the following two statements.
- A. Linear momentum of a system of particles is zero.
 - B. Kinetic energy of a system of particles is zero.
- Then
- (a) A implies B and B implies A
 - (b) A does not imply B and B does not imply A
 - (c) A implies B but B does not imply A
 - (d) A does not imply B but B implies A

END OF SECTION III

Section IV

Subject	: CHEMISTRY
Time	: 30 Minutes
Questions	: 30 (Serial No.91-120)

Section IV

Chemistry

Directions: Each question given below has four alternatives. You have to choose the best answer from the alternatives (a), (b), (c) and (d).

91. The position of Na^+ ions in NaCl structure are
(a) Corners of the cube (b) Body centre of the cube
(c) Edge centres of the cube (d) Both (b) and (c)
92. A matchbox exhibits
(a) Cubic geometry (b) Monoclinic geometry
(c) Tetragonal geometry (d) Orthorhombic geometry
93. The electrical conductivity of semiconductors
(a) Increases with temperature (b) Decreases with temperature
(c) Remains constant on heating (d) None of the above
94. A sample of a given mass of a gas at a constant temperature occupied 95 cm^3 under pressure of $9.962 \times 10^4 \text{ Nm}^{-2}$. At the same temperature, its volume at a pressure of $10.13 \times 10^4 \text{ Nm}^{-2}$ is
(a) 190 cm^3 (b) 93 cm^3 (c) 46.5 cm^3 (d) 47.5 cm^3
95. The following equilibria are given below.
 $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$; K_1
 $\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$; K_2
 $\text{H}_2 + \frac{1}{2}\text{O}_2 \rightleftharpoons \text{H}_2\text{O}$; K_3
The equilibrium constant of the reaction $2\text{NH}_3 + \frac{5}{2}\text{O}_2 \rightleftharpoons 2\text{NO} + 3\text{H}_2\text{O}$ in terms of K_1 , K_2 and K_3 is
(a) $K_1 K_2 / K_3$ (b) $K_1 K_3^2 / K_2$ (c) $K_2 K_3^3 / K_1$ (d) $K_1 K_2 K_3$
96. If the equilibrium constant of the reaction $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$ is 0.25, the equilibrium constant of the reaction $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$ would be
(a) 4 (b) 3 (c) 2 (d) 1
97. When NaNO_3 is heated in a closed vessel, oxygen is liberated and NaNO_2 is left behind. At equilibrium,
(a) Addition of NaNO_2 favours reverse reaction
(b) Addition of NaNO_3 favours forward reaction
(c) Increasing temperature favours forward reaction
(d) All statements are correct

98. The effect of increasing the pressure on the following $2A + 3B \rightleftharpoons 3A + 2B$ equilibrium is that
- Forward reaction is favoured
 - Backward reaction is favoured
 - Neither reaction is favoured
 - Both the reactions are favoured
99. A certain buffer solution contains equal concentrations of X^- and HX . The K_a for HX is 10^{-8} . The pH of the buffer is
- 3
 - 8
 - 11
 - 14
100. The solubility product of AgI at $25^\circ C$ is $1.0 \times 10^{-16} \text{ mol}^2 \text{L}^{-2}$. The solubility of AgI in 10^{-4} N solution of KI at $25^\circ C$ is approximately (in mol L^{-1})
- 1.0×10^{-12}
 - 1.0×10^{-10}
 - 1.0×10^{-8}
 - 1.0×10^{-16}
101. During isothermal expansion of an ideal gas, its
- Internal energy increases
 - Enthalpy decreases
 - Enthalpy remains unaffected
 - Enthalpy reduces to zero
102. Values of heats of formation for SiO_2 and MgO are -48.4 and -34.7 kJ respectively. The heat of the reaction $2Mg + SiO_2 \rightarrow 2MgO + Si$ is
- 21.16 kJ
 - -21.00 kJ
 - -13.62 kJ
 - 13.6 kJ
103. For a reaction to be spontaneous at all temperatures
- ΔG and ΔH should be negative
 - $\Delta H = \Delta G = 0$
 - ΔG and ΔH should be positive
 - $\Delta H < \Delta G$
104. 75% of a reaction of the first order was completed in 32 minutes. When was its half-life completed?
- 8 minutes
 - 16 minutes
 - 10 minutes
 - 7.5 minutes
105. Which of the following is not a property of hydrophilic sols?
- High concentration of dispersed phase can be easily attained
 - Coagulation is reversible
 - Viscosity and surface tension are about the same as for water
 - The charge of the particle depends on the pH value of the medium; it may be positive, negative or even zero
106. The molar conductivity of a strong electrolyte
- Increases on dilution
 - Does not change considerably on dilution
 - Decreases on dilution
 - Depends on density
107. Which of the following has the maximum number of unpaired electrons?
- Mg^{2+}
 - Ti^{3+}
 - V^{3+}
 - Fe^{2+}

108. The atomic numbers of vanadium (V), chromium (Cr), manganese (Mn) and iron (Fe) are respectively 23, 24, 25 and 26. Which of the following can have the highest second ionization enthalpy?
- (a) V (b) Cr (c) Mn (d) Fe
109. The basic character of the transition metal monoxides follows the order
- (a) $\text{CrO} > \text{VO} > \text{FeO} > \text{TiO}$ (b) $\text{TiO} > \text{FeO} > \text{VO} > \text{CrO}$
 (c) $\text{TiO} > \text{VO} > \text{CrO} > \text{FeO}$ (d) $\text{VO} > \text{CrO} > \text{TiO} > \text{FeO}$
110. On adding KI to a solution of CuSO_4
- (a) Cupric oxide is precipitated
 (b) Metallic copper is precipitated
 (c) Cuprous iodide is precipitated with the liberation of iodine
 (d) No change takes place
111. Addition of high proportions of manganese makes steel useful in making rails of railroads, because manganese
- (a) Gives hardness to steel
 (b) Helps in the formation of oxides of iron
 (c) Can deform the steel
 (d) Can show the highest oxidation state of +7
112. The radius of La^{3+} (atomic number of La is 57) is 1.06 \AA . Which of the following values will be the closest to the radius of Lu^{3+} (atomic number of Lu is 71)?
- (a) 1.60 \AA (b) 1.40 \AA (c) 1.06 \AA (d) 0.85 \AA
113. $\text{X} + \text{H}_2\text{SO}_4 \rightarrow \text{Y}$ a colorless gas with irritating smell
 $\text{Y} + \text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4 \rightarrow \text{Green solution}$
 X and Y are
- (a) SO_3^{2-} , SO_2 (b) S^{2-} , H_2S (c) CO_3^{2-} , CO_2
114. An aqueous solution of $\text{FeSO}_4 \cdot \text{Al}_2(\text{SO}_4)_3$ and chrome alum is heated with excess of Na_2O_2 and filtered. The materials obtained are
- (a) A colourless filtrate and a green residue (b) A yellow filtrate and a green residue
 (c) A yellow filtrate and a brown residue (d) A green filtrate and a brown residue
115. A new carbon-carbon bond formation is possible in
- (a) Cannizzaro reaction (b) Friedel-Craft alkylation
 (c) Clemmensen reduction (d) BVZ reaction
116. The formation of cyanohydrin from a ketone is an example of
- (a) Electrophilic addition (b) Nucleophilic addition
 (c) Nucleophilic substitution (d) Electrophilic substitution

117. CH_3COCH_3 can be converted to $\text{CH}_3\text{CH}_2\text{CH}_3$ by the action of

- (a) HIO_3 (b) HI (c) HNO_3 (d) H_3PO_3

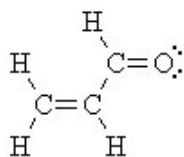
118. Butyramide is boiled with aqueous NaOH , then the reaction mixture is acidified with HCl . The products obtained are

- (a) $\text{CH}_3\text{CH}_2\text{COO}^- + \text{NH}_3$ (b) $\text{CH}_3\text{CH}_2\text{COO}^- + \text{NH}_4^+ + \text{Cl}^-$
 (c) $\text{CH}_3\text{CH}_2\text{COONa} + \text{NH}_3$ (d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} + \text{Na}^+ + \text{Cl}^-$

119. Quicklime and slaked lime are, respectively

- (a) CaCO_3 and Ca(OH)_2 (b) CaO and Ca(OH)_2
 (c) Ca(OH)_2 and CaO (d) CaO and CaCO_3

120. Which of the following structures represents the best resonance form for the following compound?



- (a) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}^+-\text{C}^--\text{O}^\bullet \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$ (b) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}^--\text{C}^+-\text{O}^\bullet \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$ (c) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}^--\text{C}^+-\text{O}^\oplus \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$ (d) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}^+-\text{C}^--\text{O}^\ominus \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$

END OF SECTION IV

END OF QUESTION PAPER

Q.NO	SUBJECT	ANSWE R	Q.NO	SUBJECT	ANSWER	Q.NO	SUBJECT	ANSWER	Q.NO	SUBJECT	ANSWER
1	ENGLISH	C	31	MATHEMATICS	D	61	PHYSICS	C	91	CHEMISTRY	D
2	ENGLISH	A	32	MATHEMATICS	A	62	PHYSICS	C	92	CHEMISTRY	D
3	ENGLISH	A	33	MATHEMATICS	D	63	PHYSICS	B	93	CHEMISTRY	A
4	ENGLISH	C	34	MATHEMATICS	B	64	PHYSICS	B	94	CHEMISTRY	B
5	ENGLISH	D	35	MATHEMATICS	C	65	PHYSICS	B	95	CHEMISTRY	C
6	ENGLISH	B	36	MATHEMATICS	B	66	PHYSICS	B	96	CHEMISTRY	A
7	ENGLISH	A	37	MATHEMATICS	C	67	PHYSICS	D	97	CHEMISTRY	D
8	ENGLISH	C	38	MATHEMATICS	B	68	PHYSICS	B	98	CHEMISTRY	C
9	ENGLISH	B	39	MATHEMATICS	D	69	PHYSICS	A	99	CHEMISTRY	B
10	ENGLISH	B	40	MATHEMATICS	B	70	PHYSICS	C	100	CHEMISTRY	A
11	ENGLISH	C	41	MATHEMATICS	B	71	PHYSICS	D	101	CHEMISTRY	C
12	ENGLISH	D	42	MATHEMATICS	B	72	PHYSICS	D	102	CHEMISTRY	B
13	ENGLISH	A	43	MATHEMATICS	A	73	PHYSICS	A	103	CHEMISTRY	A
14	ENGLISH	C	44	MATHEMATICS	A	74	PHYSICS	A	104	CHEMISTRY	B
15	ENGLISH	A	45	MATHEMATICS	C	75	PHYSICS	B	105	CHEMISTRY	C
16	ENGLISH	B	46	MATHEMATICS	A	76	PHYSICS	A	106	CHEMISTRY	B
17	ENGLISH	D	47	MATHEMATICS	A	77	PHYSICS	D	107	CHEMISTRY	D
18	ENGLISH	B	48	MATHEMATICS	A	78	PHYSICS	D	108	CHEMISTRY	B
19	ENGLISH	A	49	MATHEMATICS	C	79	PHYSICS	C	109	CHEMISTRY	C
20	ENGLISH	D	50	MATHEMATICS	A	80	PHYSICS	D	110	CHEMISTRY	C
21	ENGLISH	C	51	MATHEMATICS	A	81	PHYSICS	B	11	CHEMISTRY	A
22	ENGLISH	C	52	MATHEMATICS	B	82	PHYSICS	D	1	CHEMISTRY	B
23	ENGLISH	B	53	MATHEMATICS	B	83	PHYSICS	B	11	CHEMISTRY	A
24	ENGLISH	B	54	MATHEMATICS	A	84	PHYSICS	A	2	CHEMISTRY	C
25	ENGLISH	C	55	MATHEMATICS	C	85	PHYSICS	A	11	CHEMISTRY	B
26	ENGLISH	B	56	MATHEMATICS	C	86	PHYSICS	A	3 116	CHEMISTRY	B
27	ENGLISH	C	57	MATHEMATICS	A	87	PHYSICS	C	11 117	CHEMISTRY	B
28	ENGLISH	D	58	MATHEMATICS	C	88	PHYSICS	B	4 118	CHEMISTRY	D
29	ENGLISH	B	59	MATHEMATICS	C	89	PHYSICS	D	11 119	CHEMISTRY	B
30	ENGLISH	A	60	MATHEMATICS	B	90	PHYSICS	D	5 120	CHEMISTRY	D