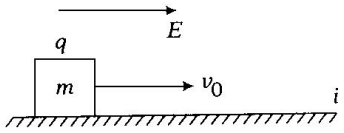
PHYSICS

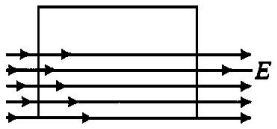
01. Three equal charges are placed on the three corners of a square. If the force between q_1 and q_2 is F_{12} and that between q_1 and q_3 is F_{13}, then the ratio of magnitudes (F_{12}/F_{13}) is
(a) 1/2 (b) 2
(c) $1/\sqrt{2}$ (d) $\sqrt{2}$

02. A charged block is projected on a rough horizontal surface with speed v_0. The value of coefficient of friction if the kinetic energy of the block remains constant is



(a) $\frac{qE}{mg}$ (b) $\frac{qE}{m}$
(c) qE (d) None of these

03. A square surface of side L metres is in the plane of the paper. A uniform electric field E (volt/m), also in the plane of the paper, is limited only to the lower half of the square surface, (see figure). The electric flux in SI units associated with the surface is



(a) zero (b) EL^2
(c) $EL^2/(2\varepsilon_0)$ (d) $EL^2/2$

04. If there are n capacitors in parallel connected to V volt source, then the energy stored is equal to
(a) nCV^2 (b) $\frac{1}{2}nCV^2$
(c) $\frac{CV^2}{n}$ (d) $\frac{1}{2n}CV^2$

05. Two spheres A and B of radius 4 cm and 6 cm are given charges of 80 μC and 40 μC , respectively. If they are connected by a fine wire, then the amount of charge flowing from one to the other is
(a) 20 μC from A to B (b) 20 μC from B to A
(c) 32 μC from B to A (d) 32 μC from A to B

06. A parallel plate capacitor has a uniform electric field E(V/m) in the space between the plates. If the distance between the plates is d(m) and area of each plate is A(m^2), then the energy (joule) stored in the capacitor is
(a) $\frac{1}{2}\varepsilon_0 E^2$ (b) $\varepsilon_0 EAd$
(c) $\frac{1}{2}\varepsilon_0 E^2 Ad$ (d) E^2Ad/ε_0

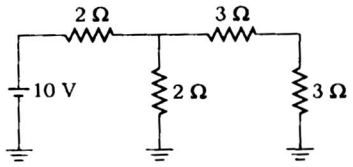
07. If E is the emf of a cell of internal resistance r and external resistance R, then potential difference across R is given as
(a) V = E/(R + r) (b) V = E
(c) V = E/(1 + r/R) (d) V = E/(1 + R/r)

08. A cell supplies a current i_1 through a resistance R_1 and a current i_2 through a resistance R_2. The internal resistance of this cell is
(a) $R_2 - R_1$ (b) $\frac{i_1R_2 - i_2R_1}{i_1 - i_2}$
(c) $\frac{i_2R_2 - i_1R_1}{i_1 - i_2}$ (d) $\left(\frac{i_1 + i_2}{i_1 - i_2}\right)\sqrt{R_1R_2}$

SKD NEW STANDARD COACHING INSTITUTE

ROUGH WORK

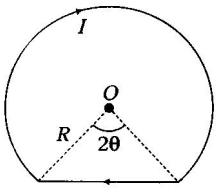
09. In the circuit shown, the current in 3 Ω resistance is



(a) 1 A (b) $\frac{1}{7}$ A

(c) $\frac{5}{7}$ A (d) $\frac{15}{7}$ A

10. A current *I* flows through a closed loop as shown in figure. The magnetic field at the centre O is



(a) $\frac{\mu_0 I}{2\pi R}(\pi - \theta + \tan\theta)$ (b) $\frac{\mu_0 I}{2\pi R}(\pi - \theta + \sin\theta)$

(c) $\frac{\mu_0 I}{2\pi R}(\theta + \sin\theta)$ (d) None of these

11. When a charged particle enters in a uniform magnetic field, then its kinetic energy
(a) remains constant (b) increases
(c) decreases (d) becomes zero

12. A circular coil of 20 turns and radius 10 cm is placed in uniform magnetic field of 0.10 T normal to the plane of the coil. If the current in coil is 5 A, then the torque acting on the coil will be
(a) 31.4 Nm (b) 3.14 Nm
(c) 0.314 Nm (d) zero

13. During a current change from 2 A to 4 A in 0.5 s, 8 V of emf is developed in a coil. The coefficient of self-induction is
(a) 1 H (b) 2 H
(c) 4 H (d) 8 H

14. The self-inductance of a coil is L Keeping the length and area same, the number of turns in the coil is increased to four times. The self-inductance of the coil will now be

(a) $\frac{1}{4}$ L (b) L

(c) 4 L (d) 16 L

15. Two circuits have coefficient of mutual induction of 0.09 H. Average emf induced in the secondary by a change of current from 0 to 20 A in 0.006 s in the primary will be
(a) 120 V (b) 80 V
(c) 200 V (d) 300 V

16. An alternating current in a circuit is given by $I = 20 \sin(100\pi t + 0.05\pi)$ A. The rms value and the frequency of current respectively are
(a) 10A and 100 Hz (b) 10A and 50 Hz
(c) $10\sqrt{2}$ A and 50 Hz (d) $10\sqrt{2}$ A and 100 Hz

17. An L-C-R series circuit is connected to a source of alternating current. At resonance the applied voltage and current flowing through the circuit will have a phase difference of
(a) zero (b) $\pi/4$
(c) $\pi/2$ (d) π

18. The average power dissipated in a pure inductor of inductance L when an AC current is passing through it, is

(a) $\frac{1}{2}LI^2$ (b) $\frac{1}{4}LI^2$

(c) $2LI^2$ (d) zero

19. A plane mirror produces a magnification of
(a) – 1 (b) + 1
(c) zero (d) Between 0 and + ∞

20. Two slits are separated by a distance of 0.5 mm and illuminated with light of $\lambda = 6000$ Å. If the screen is placed 2.5 m from the slits. The distance of the third bright image from the centre will be
(a) 1.5 mm (b) 3 mm
(c) 6 mm (d) 9 mm

ROUGH WORK

SKD New standard coaching institute
SKD NEW STANDARD COACHING INSTITUTE
Talent Search Exam (TSE)

CHEMISTRY

21. Identify the set of reagent/reaction conditions 'X' and 'Y' in the following set of transformations:

$$CH_3-CH_2-CH_2Br \xrightarrow{X} Product \xrightarrow{Y} CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$$

(a) X = dilute aqueous NaOH, 20°C
Y = HBr/acetic acid,20°C
(b) X = concentrated alcoholic NaOH, 80°C ;
Y = HBr/acetic acid,20°C
(c) X = dilute aqueous NaOH, 20°C
Y = $Br_2/CHCl_3$, 0°C
(d) X = concentrated alcoholic NaOH, 80°C ;
Y = $Br_2/CHCl_3$, 0°C

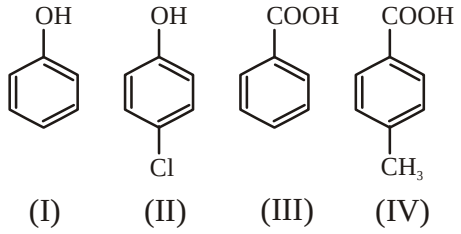
22. In the following sequence of reactions,

$$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[ether]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$$

the compound 'D' is
(a) propanal (b) butanal
(c) n-butyl alcohol (d) n-propyl alcohol

23. When diethyl ether is treated with excess of Cl_2 in the presence of sunlight, then the product formed is
(a) $CH_3CHCl–O–CH_2CH_3$
(b) $CH_3CHCl–O–CHClCH_3$
(c) $CCl_3–CCl_2–O–CCl_2–CCl_3$
(d) $CH_3CCl_2–O–CHClCH_3$

24. The correct acidity order of the following is



(I) (II) (III) (IV)

(a) (III) > (IV) > (II) > (I)
(b) (IV) > (III) > (I) > (II)
(c) (III) > (II) > (I) > (IV)
(d) (II) > (III) > (IV) > (I)

25. Which of the following ketones cannot be prepared by pyrolysis of a suitable calcium salt of a fatty acid ?
(a) Butanone (b) Pentan-3-one
(c) Benzophenone (d) Propanone

26. Reaction between $(C_6H_5CH_2)_2Cd$ and CH_3COCl leads to the formation of
(a)1-phenylpropan-1-one
(b) 1-phenylpropan-2-one
(c) 3-phenylpropanal
(d) 2-phenylpropanal

27. The acid D obtained through the following sequence of reaction is

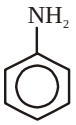
$$C_2H_5Br \xrightarrow{Alc.KOH} A \xrightarrow[CCl_4]{Br_2} B \xrightarrow[(excess)]{KCN} C \xrightarrow{H_3O^+} D$$

(a) Succinic acid (b)Malonic acid
(c) Maleic acid (d) Oxalic acid

28. Which of the following reactions will not give a primary amine?
(a) $CH_3CONH_2 \xrightarrow{Br_2/KOH}$
(b) $CH_3CN \xrightarrow{LiAlH_4}$
(c) $CH_3NC \xrightarrow{LiAlH_4}$
(d) $CH_3CONH_2 \xrightarrow{LiAlH_4}$

29. In aqueous solutions, the basic strength of amines decreases in the order
(a) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
(b) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$
(c) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$
(d) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

30. In the chemical reaction,

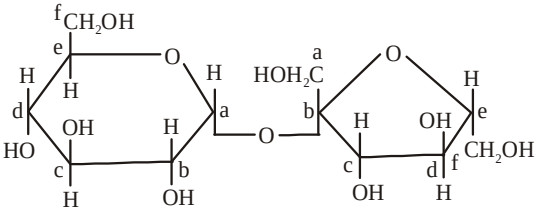


$\xrightarrow[HCl,\ 278K]{NaNO_2}$ A $\xrightarrow[\Delta]{CuCN}$ B, the compounds 'A' and 'B' respectively are
(a) fluorobenzene and phenol
(b) benzenediazonium chloride and benzonitrile
(c) nitrobenzene and chlorobenzene
(d) phenol and bromobenzene

ROUGH WORK

SKD NEW STANDARD COACHING INSTITUTE
SKD Talent Search Exam

31. Structure of a disaccharide formed by glucose and fructose is given below. Identify anomeric carbon atoms in monosaccharide units.



(a) 'a' carbon of glucose and 'a' carbon of fructose
(b) 'a' carbon of glucose and 'e' carbon of fructose
(c) 'a' carbon of glucose and 'b' carbon of fructose
(d) 'f' carbon of glucose and 'f' carbon of fructose

32. The deficiency of vitamin C causes
(a) scurvy (b) rickets
(c) pyrrohea (d) pernicious anaemia

33. Which of the following contains isoprene units?
(a) Natural rubber (b) Nylon-6,6
(c) Polyethylene (d) Dacron

34. The correct repeating structural unit of polystyrene is

(a) $-CH_2-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-$

(b) $-CH_2-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-CH_2-$

(c) $-CH_2-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-CH_2-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-$

(d) $-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-CH_2-CH_2-\underset{\displaystyle C_6H_5}{\underset{|}{CH}}-$

35. Which of the following is not used as an antacid?
(a) Magnesium hydroxide
(b) Sodium carbonate
(c) Sodium bicarbonate
(d) Aluminium phosphate

36. The following kinetic data are provided for a reaction between A and B:

Concentration of A/(M)	Concentration of B/(M)	Rate of reaction ($M\ min^{-1}$)
0.50	0.02	1.15×10^{-4}
0.50	0.04	2.30×10^{-4}
0.01	1.00	2.30×10^{-6}
0.02	1.00	0.92×10^{-5}

The value of the rate constant for the above reaction is equal to
(a) $1.15 \times 10^{-4}\ dm^3/mol\ min.$
(b) $2.30 \times 10^{-4}\ dm^6/mol^2\ min.$
(c) $2.30 \times 10^{-2}\ dm^2/mol^2\ min.$
(d) $1.15 \times 10^{-2}\ dm^3/mol\ min.$

37. The following data are for the decomposition of ammonium nitrite in aqueous solution

Volumne of N_2 in c.c.	Time (minutes)
6.25	10
9.00	15
11.40	20
13.65	25
35.05	∞

The order of the reaction is
(a) Zero (b) One
(c) Two (d) Three

38. For the first order gas phase decomposition reaction, $A\ (g) \longrightarrow B\ (g) + C\ (g)$
if P_0 is the initial pressure of A and P_t is total pressure after time t, then

(a) $k = \frac{2.303}{t}\log\frac{P_0}{P_t}$

(b) $k = \frac{2.303}{t}\log\frac{P_0}{P_t - P_0}$

(c) $k = \frac{2.303}{t}\log\frac{P_0}{P_t - 2P_0}$

(d) $k = \frac{2.303}{t}\log\frac{P_0}{2P_0 - P_t}$

ROUGH WORK

39. The decomposition of NH_3 on the surface of finely divided platinum as catalyst
(a) is always a zero order reaction
(b) is zero order at high concentration but 1st order at low concentrations
(c) is first at low concentration but zero order at high concentration
(d) is always a first order reaction

40. The rate of reaction between two reactants A and B decreases by a factor of 4 if the concentration of reactant B is doubled. The order of this reaction with respect to the reactant B is
(a) 2 (b) –1
(c) 1 (d) –2

Maths

41. Let $f(x)=\frac{x}{1+x}$ defined as $[0,\infty)\to[0,\infty), f(x)$ is
(a) one one & onto
(b) one-one but not onto
(c) not one-one but onto
(d) neither one-one nor onto

42. The inverse of the function $\frac{10^x-10^{-x}}{10^x+10^{-x}}$ is

(a) $\log_{10}(2-x)$ (b) $\frac{1}{2}\log_{10}\left(\frac{1+x}{1-x}\right)$

(c) $\frac{1}{2}\log_{10}(2x-1)$ (d) $\frac{1}{4}\log_{10}\left(\frac{2x}{2-x}\right)$

43. If $f(x)=\begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & (x+1)x(x-1) \end{vmatrix}$
then f(100) is equal to -
(a) 0 (b) 1
(c) 100 (d) –100

44. If $a^2+b^2+c^2=-2$
and $f(x)=\begin{vmatrix} 1+a^2x & (1+b^2)x & (1+c^2)x \\ (1+a^2)x & 1+b^2x & (1+c^2)x \\ (1+a^2)x & (1+b^2)x & 1+c^2x \end{vmatrix}$,
then f(x) is a polynomial of degree
(a) 2 (b) 3
(c) 0 (d) 1

45. If $A=\begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3|=125$ then the value of α is
(a) ±1 (b) ±2
(c) ±3 (d) ±5

46. The Matrix $\begin{bmatrix} 3-x & 2 & 2 \\ 2 & 4-x & 1 \\ -2 & -4 & -1-x \end{bmatrix}$ is singular then the value of x is
(a) 0,3 (b) 0,4
(c) 3,4 (d) 3,-3

47. $f(x)=|\tan x|+\tan x$ is not cont. at
(a) $n\pi$ (b) $(2n+1)\frac{\pi}{2}$
(c) $(n+1)\frac{\pi}{2}$ (d) none

48. $f(x)=\begin{cases} \sqrt{1+x^2} & x<\sqrt{3} \\ \sqrt{3}x-1 & \sqrt{3}\le x<4 \\ [x] & 4\le x<5 \\ |1-x| & x\ge5 \end{cases}$ where [x] is the greatest integer $\le x$. The number of points of discontinuity of f(x) in R is
(a) 3 (b) 0
(c) infinite (d) none

ROUGH WORK

49. The set of all points where the function $f(x) = \frac{x}{1+|x|}$ is differentiable, is :

(a) $(-\infty, \infty)$ (b) $[0, \infty)$

(c) $(-\infty,0) \cup (0,\infty)$ (d) $(0,\infty)$

50. The set of all points for which $f(x) = x^2 e^{-x}$ increasing is

(a) $(-\infty, \infty)$ (b) $(-2, 0)$

(c) $(2, \infty)$ (d) $(0, 2)$

51. Let $f(x) = (x-1)^m.(x-2)^n$, $n \in R$. Then each critical point of f(x) is either local maximum or local minimum, if

(a) m = 2, n = 3 (b) m = –2, n = 4

(c) m = 3, n = 4 (d) m = 4, n = 2

52. A tangent to the curve $y = \int_0^x |t|\,dt$ which is parallel to the line y = x, cuts off an intercept from the y-axis equal to

(a) 1 (b) $-\frac{1}{2}, \frac{1}{2}$

(c) 2 (d) –1

53. The value of $\int_0^{\pi/2} \frac{dx}{\left(1+e^{\sqrt{2}\sin\left(x-\frac{\pi}{4}\right)}\right)}$ is

(a) π (b) $\pi/3$

(c) $\pi/4$ (d) $\pi/6$

54. The value of $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1+a^x}dx, a > 0,$ is

(a) π (b) $a\pi$

(c) $\pi/2$ (d) 2π

55. If the ordinate x = a divides the area bounded by the curve $y = 1 + \frac{8}{x^2}$ and the ordinates x = 2, x =4 into two equal parts. Then a =

(a) $2\sqrt{3}$ (b) $2\sqrt{2}$

(c) 3 (d) None of these

56. The solution of differential equation $\frac{dy}{dx} = \cos(x+y)$ is

(a) $\tan\left(\frac{x+y}{2}\right) = -x + C$

(b) $\tan\left(\frac{x+y}{2}\right) = x + C$

(c) $\tan\left(\frac{x+y}{2x}\right) = x + C$ (d) None

57. If $\vec{a}, \vec{b}$ and $\vec{c}$ are unit coplanar vectors, then the scalar triple product $\left[2\vec{a}-\vec{b},\ 2\vec{b}-c,\ 2\vec{c}-\vec{a}\right] =$

(a) 0 (b) 1

(c) $-\sqrt{3}$ (d) $\sqrt{3}$

58. The lines $\frac{x+3}{-2} = \frac{y}{1} = \frac{z-4}{3}$ and

$\frac{x}{\lambda} = \frac{y-1}{\lambda+1} = \frac{z}{\lambda+2}$ are perpendicular to each other.

Then λ is equal to

(a) –5/3 (b) 4

(c) –1/4 (d) –7/2

59. If the lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and

$\frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ intersect, then the value of k is

(a) 3/2 (b) 9/2

(c) -2/9 (d) -3/2

60. $\int \frac{x^2}{(x\sin x + \cos x)^2}dx$ is equal to-

(a) $\frac{\sin x + x\cos x}{x\sin x + \cos x}$ (b) $\frac{\sin x - x\cos x}{x\sin x + \cos x}$

(c) $\frac{\cos x - x\sin x}{x\sin x + \cos x}$ (d) None of these

ROUGH WORK

SKD New standard coaching institute
SKD NEW STANDARD COACHING INSTITUTE
Talent Search Exam (TSE)

G.K.

61. World Health day is observed on?
(a) 3rd April (b) 4th April
(c) 5th April (d) 7th April

62. Which among the following bodies estimates the national income of India?
(a) Office of the Economic Advisor
(b) Ministry of Statistics
(c) Central Statistical Office
(d) Ministry of Finance

63. The right to constitutional remedies allows Indian citizens to stand up for their rights against anybody even the government of India. Which article says this?
(a) Article 31 (b) Article 32
(c) Article 33 (d) Article 34

64. What was the original name of Mirabehn, an associate and disciple of Mahatma Gandhi?
(a) Oliver Schriener
(b) Millie Graham Polock
(c) Madeline Slade
(d) Margarate Cousins

65. For his major role in the development of computer chip 'Pentium', which Indian IT expert is called the `Father of Pentium'?
(a) Ajay Bhatt (b) AnandChandrasekher
(c) VinodDham (d) Biswamohan Pani

66. GolGhar, a beehive shaped structure built in 1786 to store grains for the British Army, is located in which city?
(a) Bhopal (b) Patna
(c) Varnas (d) Lucknow

SKD NEW STANDARD COACHING INSTITUTE

67. What is the name of India's first nuclear reactor?
(a) Cirius (b) Apsara
(c) Dhruva (d) Kamini

68. Mahatama Gandhi had launched his first Satyagraha in India from which among the following places?
(a) Kheda (b) Bardoli
(c) Champaran (d) Sabarmati

69. Which among the following Indian classical dance form was developed by Siddhendra Yogi from Bhamakalapam dance drama ?
(a) Kuchipudi (b) Odissi
(c) Yakshagana (d) Kathkali

70. Which of the following European countries is known as the 'Land of a thousand lakes'?
(a) Norway (b) Sweden
(c) Finland (d) Estonia

71. Stilwell Road" connects India with which among the following neighbors?
(a) China (b) Bhutan
(c) Bangladesh (d) Pakistan

72. Major Dhyanchand's birthday is celebrated as National Sports Day in India, on which among the following dates?
(a) July 29th (b) August 29th
(c) March 29th (d) April 29th

73. The Commonwealth Games started from which among the following countries?
(a) England (b) Australia
(c) Canada (d) India

74. Who among the following had written Bangladesh's national anthem" Amar Sonar Bangla"?
(a) Nazrul Islam (b) Rabindranath Tagore
(c) AnisurRahman
(d) SantidevGhosh

ROUGH WORK

SKD Talent Search Exam

75. Which among the following types of glasses contains Cerium and other rare earths and has a high absorption of ultraviolet rays?
(a) Crookes Glass (b) Pyrex Glass
(c) Flint Glass (d) Crown Glass

76. Where are the headquarters of NATO?
(a) New York (b) Brussels
(c) Paris (d) Vienna

77. National Housing Bank is the wholly subsidiary of RBI. In which year, NHB was established?
(a) 1985 (b) 1986
(c) 1987 (d) 1988

78. The Mandal Commission was constituted during the tenure of which among the following prime ministers?
(a) Indira Gandhi (b) Morarji Desai
(c) Rajiv Gandhi (d) V P Singh

79. "The Analects" is a sacred text of which philosopher?
(a) Confucius (b) Hippocrates
(c) Socrates (d) Herodotus

80. Maximum number of animals species belong to which among the following groups?
(a) Mammalia (b) Ayes
(c) Pisces (d) Arthropoda

****

ROUGH WORK