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SUBJECT : PHYSICS & CHEMISTRY

Test Booklet Set No.
17

GUJARAT COMMON ENTRANCE TEST (GUJCET) 2018

Date: 23 April, 2018 | Duration: 2 Hours | Max. Marks: 80

:: IMPORTANT INSTRUCTIONS ::

1. The Physics and Chemistry test consists of 80 questions. Each question carries 1 mark. For each correct response, the candidate will get 1 mark. For each incorrect response ¼ mark will be deducted. The maximum marks are 80.
2. This test is of 2 hrs. duration.
3. Use Black Ball Point Pen only for writing particulars on OMR Answer Sheet and marking answer by darkening the circle '•'.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
6. The Set No. for this Booklet is **17**. Make sure that the Set No. printed on the Answer Sheet is the same as that on this booklet. In case of discrepancy, the candidate should immediately.
7. The candidate should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet.
8. Do not write you Seat No. anywhere else, except in the specified space in the Test Booklet/Answer Sheet.
9. Use of White fluid for correction is not permissible on the Answer Sheet.
10. Each candidate must show on demand his/her Admission Card to the Invigilator.
11. No candidate, without special permission of the Superintendent or Invigilator, should leave his/her sent.
12. Use of Manual Calculator is permissible.
13. The candidate should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and must sign the Attendance Sheet (Patrak - 01). Cases where a candidate has not signed the Attendance Sheet (Patrak - 01) will be deemed not to have handed over the Answer Sheet and will be dealt with as an unfair means case.
14. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
15. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
16. The candidates will write the Correct Test Booklet Set No. As given in the Test Booklet/Answer Sheet in the Attendance Sheet. (Patrak - 01)

Candidate's Name : ……………………………………………………………………………………………………
Exam. Seat No. (in figures)…………………………………….(in words)……………………………………………
Name of Exam. Centre : ………………………………………Exam. Centre No. : …………………………………
Test Booklet Set No. : ……………………………………………Test Booklet No. : ………………………………..

Candidate's Sign……………………………………………Block Supervisor Sign……………………………………………

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PHYSICS

1. Two parallel very long straight wires carrying current of 5A each are kept at a separation of 1 m. If the currents are in the same direction, the force per unit length between them is _____ N/m. ($\mu_0 = 4\pi \times 10^{-7}$ SI]

(A) 5×10^{-5}, attractive (B) 5×10^{-6}, attractive (C) 5×10^{-5}, repulsive (D) 5×10^{-6}, repulsive

Ans. **(B)**

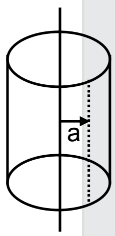
Sol. $\frac{F}{\ell} = \frac{\mu_0 I_1 I_2}{2\pi d} = 2 \times 10^{-7} \times \frac{5 \times 5}{1} = 5 \times 10^{-6}$, attractive

2. A very long straight wire of radius r carries current I. Intensity of magnetic field B at a point, lying at a perpendicular distance 'a' from the axis is $\propto$ ___.

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

Ans. **(D)**

Sol.



$$B \times 2\pi a = \mu_0 \times \frac{I}{\pi r^2} \times \pi a^2$$

$$B = \frac{\mu_0 I}{2\pi r^2} a$$

$$B \propto a$$

3. A substance is placed in a non uniform magnetic field. It experiences weak force towards the strong field. The substance is ______ type.

(A) Ferromagnetic (B) Diamagnetic (C) Paramagnetic (D) None of these

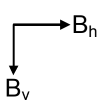
Ans. **(C)**

4. The relation between B_h, B_v and B is ________

(A) $B = \sqrt{B_h^2 + B_v^2}$ (B) $B = B_h . B_v$ (C) $B = \frac{B_v}{B_h}$ (D) $B = \frac{B_h}{B_v}$

Ans. **(A)**

Sol.



$$B = \sqrt{B_v^2 + B_h^2}$$

5. Two thin lenses of focal length f_1 and f_2 are in contact and coaxial. The power of the combination is ______

(A) $\frac{1}{\sqrt{f_1 f_2}}$ (B) $\frac{f_1+f_2}{2}$ (C) $\frac{f_1 f_2}{f_1+f_2}$ (D) $\frac{f_1+f_2}{f_1 f_2}$

Ans. **(D)**

Sol. $\frac{1}{f_{eg}} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{f_1+f_2}{f_1 f_2} = P_{eg}$

6. On decreasing the wavelength of incident light from 8000 Å to 4000 Å. The intensity of the scattered light in Rayleigh scattering will become ___ times the initial scattered intensity.

(A) 2 (B) 4 (C) 16 (D) 8

Ans. **(C)**

Sol. $I \propto \frac{1}{\lambda^4}$

$\Rightarrow \quad \frac{I_f}{I_i} = \left(\frac{\lambda_i}{\lambda_f}\right)^4 = \left(\frac{8}{4}\right)^4 = 2^4 = 16$

7. A small angled prism of refractive index 1.6 gives a deviation of 3.6°. The angle of prism is ______.

(A) 7° (B) 6° (C) 5° (D) 8°

Ans. **(B)**

Sol. $\delta = (n-1)A$

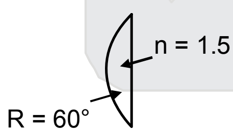
$\Rightarrow \quad 3.6° = 0.6A \quad \Rightarrow \quad A = 6°$

8. A plano convex lens is made of material having refractive index 1.5. The radius of curvature of curved surface is 60 cm. The focal length of the lens is ______ cm.

(A) –60 (B) 120 (C) 60 (D) –120

Ans. **(B)**

Sol.



$\frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$\Rightarrow \quad \frac{1}{f} = 0.5\left(\frac{1}{60}\right) = \frac{1}{120}$

f = 120

9. If the uncertainty in the position of an electron is 10^{-10} m, then the value of uncertainty in its momentum will be ______ kgms^{-1}. (h = 6.62×10^{-34} J-s]

(A) 1.05×10^{-24} (B) 1.03×10^{-24} (C) 1.06×10^{-24} (D) 1.08×10^{-24}

Ans. **(A)**

Sol. $\Delta x \Delta P \geq \frac{h}{2\pi}$

$$\Rightarrow \quad \Delta P \geq \frac{6.62 \times 10^{-34}}{2 \times 3.14 \times 10^{-10}}$$

$\Delta P \geq 1.05 \times 10^{-24} = 1.0536 \times 10^{-24}$

10. If the energy of photons corresponding to wavelength of 6000 Å is 3.2×10^{-19} J. The photon energy for wavelength of 4000 Å will be ______.

(A) 4.44×10^{-19} J (B) 2.22×10^{-19} J (C) 1.11×10^{-19} J (D) 4.80×10^{-19} J

Ans. **(D)**

Sol. $E = \frac{hc}{\lambda}$

$$3.2 \times 10^{-19} = \frac{hc}{6000} \Rightarrow hc = 6000 \times 3.2 \times 10^{-19}$$

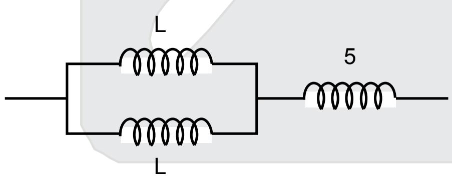
$$E = \frac{hc}{\lambda} = \frac{6000}{4000} \times 3.2 \times 10^{-19} = 4.8 \times 10^{-19} \text{ J}$$

11. Two inductors each of inductance L are connected in parallel. One more inductor of value 5 mH is connected in series of this configuration then the effective inductance is 15 mH. The value of L is ____ mH.

(A) 10 (B) 5.0 (C) 2.5 (D) 20

Ans. **(D)**

Sol.



$$\frac{L}{2} + 5 = 15$$

L = 20 mH

12. A lamp consumes only 50% of maximum power in an A.C. circuit. What is the phase difference between the applied voltage and the circuit current ?

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$

Ans. **(B)**

Sol. $P_{avg} = V_{rms}I_{rms}\cos\phi$

$P_{max} = V_{rms}I_{rms}$

$\Rightarrow \dfrac{V_{rms}I_{rms}}{2} = V_{rms}I_{rms}\cos\phi$

$\Rightarrow \cos\phi = \dfrac{1}{2}$

$\phi = \dfrac{\pi}{3}$

13. A capacitor 'C' is connected across a D.C. source, the reactance of capacitor will be ______.

(A) ZERO (B) HIGH (C) LOW (D) INFINITE

Ans. **(D)**

Sol. $X_C = \dfrac{1}{\omega C}$, $\omega = 0$

14. The dimensional formula of $\mu_0\epsilon_0$ is ______

(A) $M^0L^{-2}T^2$ (B) $M^0L^2T^{-2}$ (C) $M^0L^1T^{-1}$ (D) $M^0L^{-1}T^1$

Ans. **(A)**

Sol. $C = \dfrac{1}{\sqrt{\mu_0\epsilon_0}} \Rightarrow \mu_0\epsilon_0 = \dfrac{1}{C^2}$

$C \rightarrow M^0L^1T^{-1}$

$\dfrac{1}{C^2} \rightarrow M^0L^{-2}T^2$

15. Match Column I and Column II

	Column-I		Column-II
(i)	Interference	(P)	Coherent sources
(ii)	Brewster's Law	(Q)	$\mu = \dfrac{1}{\sin C}$
(iii)	Malus Law	(R)	$\mu = \tan\theta_p$
(iv)	Total Internal reflection	(S)	$I = I_0\cos^2\theta$

(A) i $\rightarrow$ P, ii $\rightarrow$ S, iii $\rightarrow$ R, iv $\rightarrow$ Q

(B) i $\rightarrow$ P, ii $\rightarrow$ R, iii $\rightarrow$ S, iv $\rightarrow$ Q

(C) i $\rightarrow$ Q, ii $\rightarrow$ S, iii $\rightarrow$ R, iv $\rightarrow$ P

(D) i $\rightarrow$ R, ii $\rightarrow$ Q, iii $\rightarrow$ S, iv $\rightarrow$ P

Ans. **(B)**

Sol. (i) $\rightarrow$ P

(ii) $\rightarrow$ R

Brew ster's Law

$\Rightarrow \mu = \tan i_P$

(iii) $\rightarrow$ S

Malus law

$I = I_0\cos^2\phi$

(iv) $\rightarrow$ Q

TIR

$\mu\sin C = 1 \Rightarrow \mu = \dfrac{1}{\sin C}$

16. Frequencies of various radiations are given as

$f_v \to$ Visible light

$f_r \to$ Radio waves

$f_{uv} \to$ Ultra Violet waves

Then which of following is true ?

(A) $f_{uv} < f_v < f_r$ (B) $f_r < f_v < f_{uv}$ (C) $f_v < f_r < f_{uv}$ (D) $f_{uv} < f_r < f_v$

Ans. **(B)**

Sol. $\lambda_{uv} < \lambda_v < \lambda_r$

$f_{uv} > f_v > f_r$

17. Wavelength of characteristic X-ray depends on which property of target ?

(A) A (B) Z (C) Melting point (D) All of these

Ans. **(B)**

Sol. Wavelength of characteristic x–ray depends on material used as the metal target (Z)

18. The energy of the fast neutrons emitted in a nuclear fission reactor is approximately _______

(A) 2 MeV (B) 2 KeV (C) 10 MeV (D) 20 MeV

Ans. **(A)**

Sol. 2MeV

19. in radioactive reaction

$${}^{A}_{Z}X \to {}^{A}_{Z+1}X_1 \to {}^{A}_{Z+2}X_2 \to {}^{A-4}_{Z}X_3 \to {}^{A-4}_{Z+1}X_4$$

successive emission of particles is

(A) $\beta^-, \beta^-, \beta^-, \alpha$ (B) $\beta^-, \beta^-, \beta^+, \alpha$ (C) $\beta^-, \beta^-, \alpha, \alpha$ (D) $\beta^-, \beta^-, \alpha, \beta^-$

Ans. **(D)**

Sol.
$${}^{A}_{Z}X \longrightarrow {}^{A}_{Z+1}X_1 + \beta^-$$
$${}^{A}_{Z+1}X_1 \longrightarrow {}^{A}_{Z+2}X_2 + \beta^-$$
$${}^{A}_{Z+2}X_2 \longrightarrow {}^{A-4}_{Z}X_3 + \alpha$$
$${}^{A-4}_{Z}X_3 \longrightarrow {}^{A-4}_{Z+1}X_4 + \beta^-$$

20. In CE transistor amplifier, the collector junction has ____ bias and emitter junction has ____ bias.

(A) reverse, reverse (B) forward, forward (C) reverse, forward (D) forward, reverse

Ans. **(C)**

Sol. For operation in active region (i.e., for amplification to work) the collector–base junction is reverse biased while emitter–base junction is forward biased.

21. When carrier wave of 2.5 MHz frequency is amplitude modulated, the resulting AM wave has maximum of 15 V and minimum amplitude of 10 V. The modulation index is ______.

(A) 30% (B) 20% (C) 10% (D) 40%

Ans. **(B)**

Sol. Molulation Index = $\dfrac{V_m}{V_c} = \dfrac{\frac{(V_{max} - V_{min})}{2}}{\frac{(V_{max} + V_{min})}{2}}$

$$= \frac{15-10}{15+10} \times 100\% = 20\%$$

22. Which of the following is wrong for interference fringes?

(A) Fringes are due to limited portion of wave front

(B) All bright fringes are equally bright

(C) Distance between two consecutive fringes is constant

(D) Fringes are due to the use of coherent sources

Ans. (C)

23. A ray of light traveling in impure water is incident on a glass plate immersed in it. When the angle of incidence is 51º, the reflected ray is totally plane polarized. Given that refractive index of impure water is 1.4. The refractive index of glass should be ________.(tan 51º = 1.235)

(A) 1.64 (B) 1.34 (C) 1.53 (D) 1.73

Ans. (D)

Sol. $\theta_i + \theta_r = \frac{\pi}{2}$

Applying snell's law :

$\mu_{water}\sin\theta_i = \mu_{glass}\sin\theta_r = \mu_{glass}\cos\theta_r$

$\Rightarrow \quad \mu_{glass} = 1.4 \times \tan 51° = 1.4 \times 1.235 \approx 1.73$

24. A coil having 200 turns has a surface area of 0.15 m^2. A magnetic field of strength 0.2 T applied perpendicular to this changes to 0.6 T in 0.4 s, then the induced emf in the coil is _____ V.

(A) 45 (B) 30 (C) 15 (D) 60

Ans. (B)

Sol. $\phi = n \times A \times B$

where n $\equiv$ No. of turns

A $\equiv$ Area of loop

B $\equiv$ Magnetic field

$\therefore \quad \varepsilon = \frac{\Delta\phi}{\Delta t} = nA\frac{\Delta B}{\Delta t}$

$= 200 \times 0.15 \times \frac{0.6 - 0.2}{0.4} = 30V$

25. A sinusoidal A.C. current flows through a resistor of resistance 10Ω. If the peak current is 2 A flowing through the resistor then the power dissipated in ________ W.

(A) 30 (B) 20 (C) 10 (D) 40

Ans. (B)

Sol. Average power dissipated = $\langle I^2(t)R\rangle$

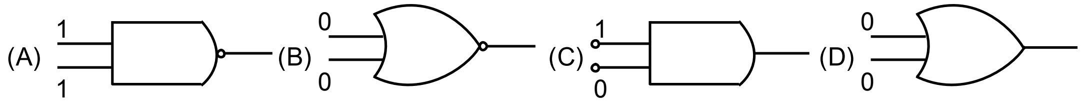
$= \langle I_0^2 R \sin^2(\omega t)\rangle$

$= I_0^2 R\langle \sin^2(\omega t)\rangle$

$= 4 \times 10 \times 1/2$

= 20 watt.

26. Which of following gates produces output of 1?



Ans. **(B)**

Sol. Output of circuit (B) is $\overline{0.0} = \overline{0} = 1$

27. The value of β of a transistor is 19. The value of α will be

(A) 0.93 (B) 0.98 (C) 0.99 (D) 0.95

Ans. **(D)**

Sol. $I_E = I_B + I_C$

$$\Rightarrow \quad \frac{I_E}{I_C} = \frac{I_B}{I_C} + 1 \quad \Rightarrow \quad \frac{1}{\alpha} = \frac{1}{\beta} + 1 = \frac{1}{19} + 1$$

$$\Rightarrow \quad \frac{1}{\alpha} = \frac{20}{19} \quad \Rightarrow \quad \alpha = \frac{19}{20} = 0.95$$

28. If the half-life of a radioactive element is 10 hr, its average life = _____

(A) 1.44 (B) 6.93 (C) 14.4 (D) 0.693

Ans. **(C)**

Sol. $\lambda t_{1/2} = \ell n\, 2 = 0.693$

$$\Rightarrow t_{avg} = \frac{1}{\lambda} = \frac{t_{1/2}}{\ell n 2} = \frac{10}{0.693} \Rightarrow t_{avg} = 14.4$$

29. _____ is the wavelength of photon of energy 35 Kev.

$h = 6.625 \times 10^{-34}$ J-s, $c = 3 \times 10^8$ m/s, 1 eV = 1.6×10^{-19}J.

(A) 35×10^{-12}m (B) 35 Å (C) 3.5 nm (D) 3.5 Å

Ans. **(A)**

Sol. $$\lambda = \frac{hc}{E_\gamma} = \frac{6.625 \times 10^{-34} \times 3 \times 10^8}{35 \times 10^3 \times 1.6 \times 10^{-19}} m$$

$= 0.35 \times 10^{-10}$ m $= 35 \times 10^{-12}$ m

30. The band gaps of an insulator, conductor and semi conductor are respectively E_{g1}, E_{g2} and E_{g3}. The relationship between them is given as ________ .

(A) $E_{g1} > E_{g2} < E_{g3}$ (B) $E_{g1} > E_{g2} > E_{g3}$

(C) $E_{g1} < E_{g2} > E_{g3}$ (D) $E_{g1} < E_{g2} < E_{g3}$

Ans. **(A)**

Sol. Band gap of Insulator is highest, while that of conductor is least. So,

$Eg_1 > Eg_3 > Eg_2$

$Eg_1 > Eg_2$

$Eg_3 > Eg_2$

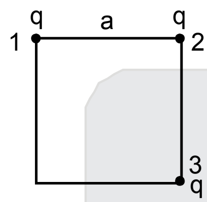
$Eg_1 > Eg_2 < Eg_3$

31. Three identical charges are placed on three vertices of a square. If the force acting between q_1 and q_2 is F_{12} and between q_1 & q_3 is F_{13} then $\frac{F_{13}}{F_{12}}$ = ______.

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

Ans. (A)

Sol.



$$f_{12} = \frac{Kq^2}{a^2}$$

$$f_{13} = \frac{Kq^2}{(\sqrt{2}\,a)^2} = \frac{Kq^2}{2a^2}$$

$$\frac{f_{13}}{f_{12}} = \frac{1}{2}$$

32. When a $10\mu C$ charge is enclosed by a closed surface, the flux passing through the surface is ϕ. Now another $10\mu C$ charge is placed inside the closed surface, then the flux passing through the surface is ______.

(A) 4ϕ (B) ϕ (C) 2ϕ (D) zero

Ans. **(C)**

Sol. Electric flux = $\frac{q_{inc}}{\varepsilon_0}$

$$\phi = \frac{10\mu C}{\varepsilon_0}$$

If more 10mC charge is placed.

Electric flux = $= \frac{20\mu C}{\varepsilon_0} = 2\phi$

33. The electric force acting between two point charges kept at a certain distance in vacuum is 16N. If the same two charges are kept at the same distance in a medium of dielectric constant 8. The electric force acting between them is ______ N.

(A) 1024 (B) 128 (C) 16 (D) 2

Ans. **(C)**

33.

A B

Electric force acting between them is same as it was in vaccum so,

Ans = 16N

Net force on each charge $= \frac{16}{8} = 2N$

34. The unit of polarizability of the molecule is: ______.

(A) $C^2m^1N^{-1}$ (B) $C^{-2}m^{-1}N^1$ (C) $C^{-2}m^1N^{-1}$ (D) $C^2m^{-1}N^{-1}$

Ans. **(A)**

Sol. Polarizability (α) is the ratio of induced dipole moment to the electric field E.

$$\alpha = \frac{P}{E}$$

$$\Rightarrow \quad \frac{Cm}{N/C} = c^2mN^{-1}$$

35. On the axis and on the equator of an electric dipole for all points _____.

(A) On both of them $V \neq 0$ (B) On both of them V = 0

(C) On the axis V = 0 and on equator $V \neq 0$ (D) On the axis $V \neq 0$ and on equator V = 0

Ans. **(D)**

Sol. On the axis $v \neq 0$ and on equator, v = 0

36. When the temperature of a conductor increases the ration of conductivity and resistivity ______.

(A) remain constant (B) increase

(C) decrease (D) increase or decrease

Ans. **(C)**

Sol. When temp of conductor increase its conductivity decrease and resistivity increase.

$$\rho = \frac{1}{\sigma}$$

Conductivity is reciprocal of resistivity

$$\frac{\sigma}{\rho} = \sigma^2$$

So it decrease.

37. You are given 10 resistors each of resistance 2Ω. First they are connected to obtain possible minimum resistance. Then they are connected to obtain possible maximum resistance. The ration of maximum and minimum resistance is ____.

(A) 100 (B) 10 (C) 2.5 (D) 25

Ans. **(A)**

Sol. Maximum resistance when connected in series.

$$R_S = 20\Omega$$

Minimum resistance when connected in parallel.

$$R_p = \frac{2}{10}\Omega$$

$$\therefore \quad \frac{R_S}{R_P} = \frac{20}{2/10} = 100$$

38. The dimensional formula of mobility is ______.

(A) $M^{-1}L^{1}T^{2}A^{1}$ (B) $M^{1}L^{0}T^{-2}A^{-1}$ (C) $M^{1}L^{-1}T^{-2}A^{-1}$ (D) $M^{-1}L^{0}T^{2}A^{1}$

Ans. **(D)**

Sol. Mobility = $\frac{Vd}{E} = \frac{\text{Drift velocity}}{\text{Electric field}}$

$$= \frac{LT^{-1}}{MLT^{-3}A^{-1}} = M^{-1}L^{0}T^{2}A^{1}$$

39. An electron having mass 9.1×10^{-31} kg, charge 1.6×10^{-19} C and moving with the velocity of 10^6 m/s enters are region where magnetic field exists. If it describes a circle of radius 0.2 m then the intensity of magnetic field must be _______ $\times 10^{-5}$ T.

(A) 14.4 (B) 5.65 (C) 2.84 (D) 1.32

Ans. **(C)**

Sol. $R = \frac{mv}{qB} \Rightarrow B = \frac{mv}{qR}$

$$B = \frac{9.1 \times 10^{-31} \times 10^{6}}{1.6 \times 10^{-19} \times 0.2} = \frac{9.1}{1.6 \times 2} \times 10^{-6} = 2.84 \times 10^{-6} \text{ T}$$

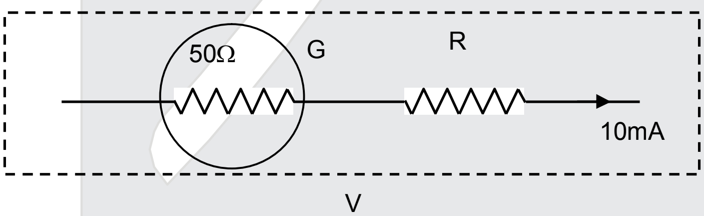
40. A galvanometer of resistance 50Ω giving full scale deflection for a current of 10 milliampere is to be changed into a voltmeter of range 100 V.

A resistance of _____Ω has to be connected in series with the galvanometer

(A) 9950 (B) 10025 (C) 10000 (D) 9975

Ans. **(A)**

Sol.



$100 = (R + 50) \times 10 \times 10^{-3}$

$R + 50 = 10000 \Rightarrow R = 9950$

CHEMISTRY

41. How many grams of Cl_2 gas will be obtained by the complete reaction of 31.6 gm of potassium permanganate with hydrochloric acid ?
[Mole mass of $KMnO_4$ = 316 gm/mol]
(A) 71 (B) 17.75 (C) 35.5 (D) 142

Ans. (B)

Sol. $2KMnO_4 + 16HCl \longrightarrow 2KCl + 2MnCl_2 + 5Cl_2 + 8H_2O$

$$\frac{\text{mole of } KMnO_4}{2} = \frac{\text{mole of KCl}}{5}$$

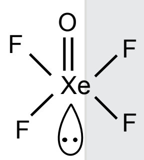
$$\text{Mole of } Cl_2 = \frac{31.6}{316} \times \frac{5}{2} = \frac{1}{4} \text{ mole}$$

$$\text{Gram wt. of } Cl_2 = \frac{1}{4} \times 71 = 17.75 \text{ gm.}$$

42. What is the structure of $XeOF_4$?
(A) Square pyramidal (B) Trigonal bipyramidal
(C) Pyramidal (D) Square bipyramidal

Ans. (A)

Sol. $XeOF_4$



Square Phrimidal

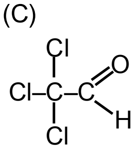
43. Which one is not an allylic halide ?
(A) 3-Chloro cyclo hex -1 - ene (B) 1 – Chloro but - 1 - ene
(C) 1 – Chloro but - 2 - ene (D) 3 – Chloro prop – 1 – ene.

Ans. (B)

Sol. 1-chlorobut-1-ene (CH_3–CH = CH–Cl) is classified as vinylic halide.

44. Which is the main organic product obtained by the reaction of 2, 2, 2 – trichloro ethanal with calcium hydroxide?
(A) Methylene chloride (B) Carbon tetrachloride
(C) Chloroform (D) Trichloro ethane

Ans. (C)

Sol. 

$\xrightarrow{Ca(OH)_2}$ $CHCl_3$ + Calcium formate

45. Which of the following compound is optically inactive ?
(A) 3 - Chloro but - 1 - ene (B) 2, 3 - Dichloro butane
(C) 2 - Hydroxy propanoic acid (D) 2, 2 - Dichloro pentane

Ans. (D)

Sol. $CH_3-CH_2-CH_2-\overset{Cl}{\underset{Cl}{C}}-CH_3$

2, 2–Dichloropentane has no chiral carbon hence optically inactive.

46. Which of the organic products of the following reactions has the least boiling point ?

(A) $CH_3-CH_2-COOH \xrightarrow[H_2O]{LiAlH_4}$

(B) $CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[H_2O]{NaBH_4}$

(C) $CH_3-CH_2-CHO \xrightarrow[H_2O]{NaBH_4}$

(D) $CH_3-CH=CH_2 \xrightarrow[H_2O_2 . OH^-]{(BH_3)_2}$

Ans. (B)

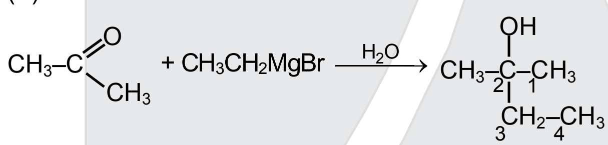
Sol. In (B), isopropyl alcohol is formed, which has lesser boiling point than propyl alcohol formed in A, C and D, because of lesser extent of H-bonding.

47. Which is the final product obtained by the reaction of a grignard reagent ethyl Magnesium bromide with propanone ?

(A) Pentane - 1 - ol
(B) 2 - Methyl – butane - 2 - ol
(C) Pentane - 2 - ol
(D) 3 - Methyl - butane - 2 - ol

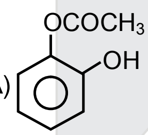
Ans. (B)

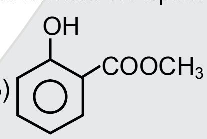
Sol.

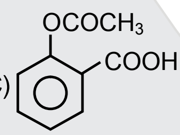


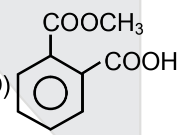
2-Methylbutan-2-ol

48. Which is the correct structural formula of Aspirin?

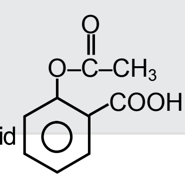
(A) 

(B) 

(C) 

(D) 

Ans. (C)

Sol. Aspirin is acetyl salicylic acid 

49. The units for the rate constant and the rate of reaction are same for a reaction. What will be the order of the reaction?

(A) Second (B) Zero (C) First (D) Third

Ans. (B)

Sol. For zero order Reaction Rate low :

R = k[A]° Unit of k = mole/liter

50. At 27º C temperature, time required for 75% completion of a first order reaction is 20 seconds. What will be its rate constant?

(A) 0.693 sec^{-1} $mole^{-1}$ lt
(B) 0.0693 sec^{-1}
(C) 0.693 sec^{-1}
(D) 0.0693 sec^{-1} $mole^{-1}$ lt

Ans. (B)

Sol. For I[st] order Reaction :

$$K = \frac{1}{t}\,\ell n\,\frac{Co}{Ct} \quad \text{at 75\% completion : Ct= 25\%}$$

$$K = \frac{2.303}{20}\log\frac{100}{25} : k = 0.0697\,sec^{-1}$$

51. Which statement is incorrect for a catalyst?

(A) It does not affect the equilibrium constant
(B) It increases the proportion of products in less time
(C) It decreases the activation energy of a reaction
(D) It increases the free energy change for the reaction

Ans. (D)

Sol. Catalyst not change the free energy change for the reaction.

52. During electrophoresis of colloidal sol of $Fe(OH)_3$, the colloidal particles-

(A) Move towards anode and cathode both
(B) Move towards cathode
(C) Move towards anode
(D) Do not move

Ans. (B)

Sol. $Fe(OH)_3$ is a type of positive sol. So Partical moves towards cathode during electrophoresis.

53. In manufacturing of sulphuric acid in presence of platinum catalyst, which metal impurity acts as catalytic poison?

(A) Fe (B) Cr (C) Cu (D) V

Ans. (B)

Sol. Reactive metal (impurity) can behave as a negative catalyst.

54. Which ion has the least value of theoretical magnetic moment?

(A) Cr^{3+} (B) Co^{3+} (C) Ti^{3+} (D) V^{3+}

Ans. (C)

Sol. Magnetic moment $\mu = \sqrt{n(n+2)}$ BM

Cr^{+3} = $|Ar|, 3d^3$ number of unpaired $e^- = 3$

Cr^{+3} = $|Ar|, 3d^6$ number of unpaired $e^- = 4$

Ti^{+3} = $|Ar|, 3d^1$ number of unpaired $e^- = 1$

$V^{+3} = |Ar|, 3d^2$ number of unpaired $e^- = 2$

least magnetic moment shows by Ti^{+3}

55. Which of the following mixture can form an alloy?
(A) Fe, Ni, Cr (B) Cr, Co, Na (C) Fe, Mn, Mg (D) Ni, Mg, Na

Ans. (A)

Sol. Fe, Ni, Cr are transition metals can form an alloy.

56. Which of the following statements is incorrect?
(A) $K_4[Ni(CN)_4]$ and $K_2[Ni(CN)_4]$ both have same magnetic moment
(B) $K_2[Ni(CN)_4]$ is diamagnetic while $K_2[NiCl_4]$ is paramagnetic.
(C) $K_4[Ni(CN)_4]$ is square planar while $K_2[Ni(CN)_4]$ is tetrahedral
(D) $K_2[NiCl_4]$ and $K_4[Ni(CN)_4]$ both have same geometrical shapes

Ans. (C)

Sol. $K_4[Ni(CN)_4]$ $\Rightarrow$ $Ni^{\circ} = 3d^8\,4s^2$ Cr $\rightarrow 3d^{10}\,4s^{\circ}$
Hyb. = Sp^3 tetrahedral "DM" (Diamagnetic)

$K_2[Ni\,(CN)_4]$ $\Rightarrow$ $Ni^{+2} = 3d^8\,4s^{\circ} \rightarrow 3d^8\,4s^{\circ}$
Paring of e^- 
Hyb = dsp^2 squate plannar "DM" (Diamagnetic)

57. The aqueous solution of which of the following complex has the least conductivity under identical conditions.
(A) Penta aqua chlorido chromium (III) chloride
(B) Tetra aqua dichlorido chromium (III) chloride
(C) Hexa aqua chromium (III) chloride
(D) Tri aqua trichlorido chromium (III)

Ans. (D)

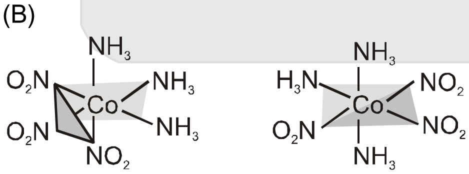
Sol.

Compound	ions
(A) $[Cr(H_2O)_5Cl]Cl_2$	3
(B) $[Cr(H_2O)_4Cl_2]Cl$	2
(C) $[Cr(H_2O)_6]Cl_3$	4
(D) $[Cr(H_2O)_3Cl_3]$	0

Conductivity order : (D) < (B) < (A) < (C)

58. Which complex possess facial isomer?
(A) $K[Fe(NH_3)_2(CN)_4]$ (B) $[Co(NH_3)_3(NO_2)_3]$
(C) $[Co(NH_3)_4CO_3]Cl$ (D) $[Ni(H_2O)_4(NH_3)_2]SO_4$

Ans. (B)

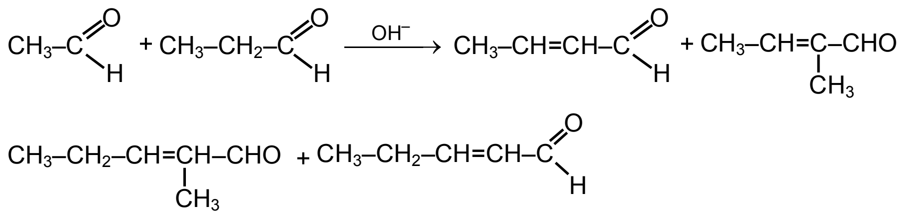


Sol. fac– mer–

The facial(fac) and meridional(mer) isomers of $[Co(NH_3)_3(NO_2)_3]$. (M $a_3\,b_3$ type)

59. Which of the following is not a final product obtained by cross aldol condensation of ethanal and propanal?
(A) 3-Methyl-but-2-enal (B) 2-Methyl-pent-2-enal
(C) But-2-enal (D) Pent-2-enal

Ans. (A)

Sol. 

The possible cross aldol products includes B, C and D but not A

60. Which is the main functional group in Acrolein?

(A) Aldehyde (B) Alkene (C) Nitrile (D) Ester

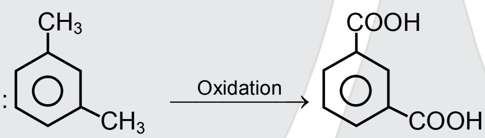
Ans. (C)

Sol. $CH_2=CH–C\equiv N$ Acrolein

61. Which of the following compound upon oxidation gives isophthalic acid?

(A) p-Xylene (B) m-Xylene (C) o-Xylene (D) m-Cresol

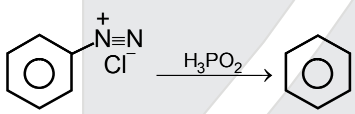
Ans. (B)

Sol. m-Xylene :  (Isophthalic acid)

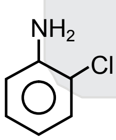
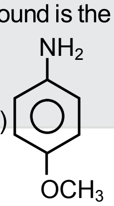
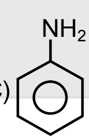
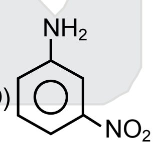
62. Which is the oxidized product obtained when benzene diazonium chloride reacts with phosphonic acid in presence of water?

(A) Chloro benzene (B) Phenol (C) Benzene (D) Phosphorus acid

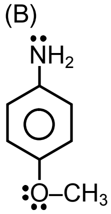
Ans. (C)

Sol. 

63. Which of the following compound is the most basic?

(A)  (B)  (C)  (D) 

Ans. (B)

Sol. 

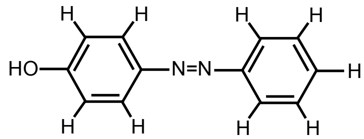
+M of $–O–CH_3$ group increase the basicity.

64. The number of σ and π bonds in orange azo dye is _________ and _________ respectively

(A) 27 and 7 (B) 24 and 7 (C) 26 and 7 (D) 26 and 6

Ans. (C)

Sol.



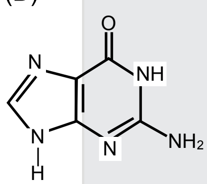
26 σ and 7π.

65. Which one is a purine base?

(A) Uracil (B) Thymine (C) Cytosine (D) Guanine

Ans. (D)

Sol.



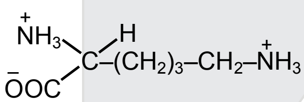
Guanine

66. Which of the following amino acid has pH greater than 7?

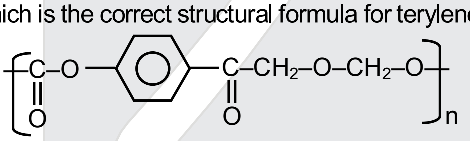
(A) Glutamic acid (B) Lysine (C) Glycine (D) Alanine

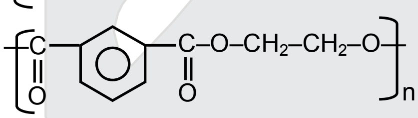
Ans. (B)

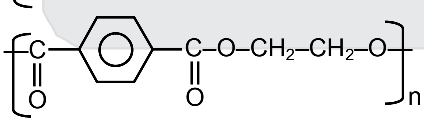
Sol. Lysine is example of basic amino acids :

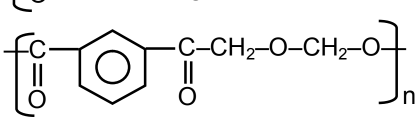


67. Which is the correct structural formula for terylene?

(A) 

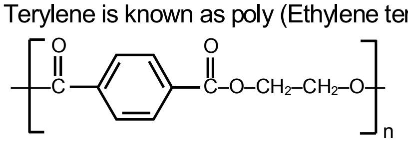
(B) 

(C) 

(D) 

Ans. (C)

Sol. Terylene is known as poly (Ethylene terphthalate)



68. Which are the monomers of Buna-N?
(A) Buta-1, 3-diene and prop-1-ene-1-nitrile
(B) Buta-1, 2-diene and acrylonitrile
(C) Buta-1, 3-diene and prop-2-ene-1-nitrile
(D) Buta-1, 2-diene and prop-2-ene-1-nitrile

Ans. (C)

Sol. $\underset{3}{CH_2}=\underset{2}{CH}-\underset{1}{C}\equiv N$

Buna-N is a polymer of Buta-1,3-diene and Acrylonitrile.

69. Choose the correct option for the suitable match between Column I and Column II

	Column-I		Column-II
(P)	Artificial Sweetner	(L)	Caramel
(Q)	Food Preservative	(M)	Ascorbic acid
(R)	Anti Oxidants	(N)	Alitame
(S)	Food colours	(O)	Sorbic acid

(A) P→N, Q →O, R→L, S→M
(B) P→N, Q →M, R→O, S→L
(C) P→N, Q →O, R→M, S→L
(D) P→L, Q →O, R→M, S→N

Ans. (C)

Sol.

(P)	Artificial Sweetner	(N)	Alitame
(Q)	Food Preservative	(O)	Sorbic acid
(R)	Anti Oxidants	(M)	Ascorbic acid
(S)	Food colours	(L)	Caramel

70. Which of the following drugs gives relief from anxiety and stress?
(A) Ofloxacin (B) Aspirin (C) Luminal (D) Mestranol

Ans. (C)

Sol. Luminal is a trade name for Antianxiety and antistress drug.

71. If the edge of a body centred unit cell is 400 pm, what will be the approximate radius of the atom present in it? (in pm)
(A) 200 (B) 141 (C) 173 (D) 924

Ans. (C)

Sol. For BCC : $\sqrt{3}\,a = 4\,R$

$$R = \frac{\sqrt{3}a}{4} = \frac{\sqrt{3}\times 400}{4} = 173 \text{ Pm}$$

72. Which of the following is Ferromagnetic?
(A) O_2 (B) CrO_2 (C) MnO (D) Fe_3O_4

Ans. (B)

Sol. Ferromagnetic substance : CrO_2

73. What is the normality of aqueous solution of H_2SO_4 having pH = 1.
(A) 1 N (B) 0.05 N (C) 0.1 N (D) 0.5 N

Ans. (C)

Sol. PH = 1 $[H^+] = 10^{-1}$ M
N of H_2SO_4 = 0.1 N

74. Which of the following mixture is non-ideal solution?
(A) Chloroform and acetone (B) Benzene and toluene
(C) Chlorobenzene and bromobenzene (D) Bromoethane and chloroethane

Ans. (A)

Sol. $CHCl_3 + CH_3COCH_3$ is non – ideal solution mixture.
[Show (–)ve deviation)

75. Which solution is isotonic with 6% W/V aqueous solution of urea? [Mole mass of Urea = 60 gm. mol^{-1}]
(A) 0.25 M NaCl (B) 0.5 M NaCl (C) 0.1 M NaCl (D) 1 M NaCl

Ans. (B)

Sol. For isotonic sol^n

$\pi_1 = \pi_2$

$i_1 c_1 = i_2 c_2$

$$1\left[\frac{6 \times 1000}{60 \times 100}\right] = 2\ [M]$$

= M = 0.5

= 0.5 M NaCℓ.

76. In which metal container, the aqueous solution of $CuSO_4$ can be stored?

$E^o_{Cu^{2+}/Cu} = 0.34$ V

$E^o_{Fe/Fe^{2+}} = 0.44$ V, $E^o_{Al/Al^{3+}} = 1.66$ V

$E^o_{Ni/Ni^{2+}} = 0.25$ V, $E^o_{Ag^+/Ag} = 0.80$ V

(A) Ag (B) Ni (C) Fe (D) Al

Ans. (A)

Sol. SRP value of Ag^+/Ag > SRP Of Cu^{+2}/Cu
So $CuSO_4$ can store in Ag container.

77. For how much time, 10 ampere electric current should be passed through a dilute aqueous $NiSO_4$ solution during electrolysis using inert electrode, in order to get 5.85 gm Nickel?
[At. mass of Ni = 58.5 gm]
(A) 965 sec. (B) 3860 sec. (C) 1930 sec. (D) 9650 sec.

Ans. (C)

Sol. w = zit

$$5.85 = \frac{58.5}{2 \times 96500} \times 10 \times t$$

t = 1930 sec

78. What will be the oxidation potential for the following hydrogen half cell at 1 bar pressure and 25º C temperature ?

$$\mathrm{Pt}\left|\underset{1\text{bar}}{H_{2(g)}}\right|HCl_{(aq)}\,pH = 3$$

(A) 0.059 V (B) 0.188 V (C) 0.177 V (D) 0.000 V

Ans. (C)

Sol. For oxidation

$$\frac{1}{2}H_2(g) \longrightarrow H^+(aq) + e^-$$

P = 1 atm

$$E_{OP} = E^{O}_{OP}\ \frac{-0.059}{1}\ \log\,[H^+]$$

$E_{OP} = 0 + 0.059$ pH

$= 0.059 \times 3 = 0.177$ V

79. Which ore does not contain carbonate?

(A) Calamine (B) Ciderite (C) Malachite (D) Zincite

Ans. (D)

Sol. Zincite = ZnO

80. Which is the correct order of metallurgy for the extraction of copper metal?

(A) Concentration $\rightarrow$ smelting $\rightarrow$ bessimerisation $\rightarrow$ roasting

(B) Concentration $\rightarrow$ smelting $\rightarrow$ roasting $\rightarrow$ bessimerisation

(C) Concentration $\rightarrow$ roasting $\rightarrow$ smelting $\rightarrow$ bessimerisation

(D) Concentration $\rightarrow$ roasting $\rightarrow$ bessimerisation $\rightarrow$ smelting

Ans. (C)

Sol. Order of metallurgy for extraction of Cu metal from copper pyrites (Cu FeS_2) is (C) :

Concentration $\rightarrow$ roasting $\rightarrow$ Smelting $\rightarrow$ Bessimerisation