GUJCET-PCE-2021

Test Booklet No. 1501789 Test Booklet Set No. **15**

This booklet contains 32 pages.

DO NOT open this Test Booklet until you are asked to do so.

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 hours** duration.
3) Use **Black Ball Point Pen only** for writing particulars on OMR Answer Sheet and marking answers 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 15 . 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 report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
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 your 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 seat.
12) Use of Simple (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)

PHYSICS

1) For LCR ac series circuits, L = 25 mH, R = 3Ω, C = 62.5 μF. What is the frequency of the sources at which resonance occurs?

(A) 127.39 Hz
(B) 35.40 Hz
(C) 100 Hz
(D) 21 Hz

2) For a series LCR circuit with L = 2 H, C = 18 μF and R = 10 Ω. What is the value Q-factor of this circuit?

(A) 22.22
(B) 55.55
(C) 44.44
(D) 33.33

3) What is Range of Radio Frequency Band of FM (Frequency Modulated Band)?

(A) 500 kHz to 1000 MHz
(B) 54 MHz to 890 MHz
(C) 530 kHz to 1710 kHz
(D) 88 MHz to 108 MHz

4) A plane electromagnetic wave of frequency 25 MHz travels in free space along the X-direction. At a particular point in space and time, where $\vec{B}=2.1\times10^{-8}\,\hat{k}T$ then find $\vec{E}$ at this point?

(A) $-2.1\,\hat{j}\frac{V}{m}$
(B) $6.3\,\hat{j}\frac{V}{m}$
(C) $4.2\,\hat{j}\frac{V}{m}$
(D) $-3.2\,\hat{j}\frac{V}{m}$

(Space for Rough Work)

E.

2

5) Glass prism having a refractive index μ, placed in a air, for that angle of minimum deviation of prism is same as angle of prism. Then what is value of angle of prism?

(A) $2\cos^{-1}\left(\mu/2\right)$ (B) $2\cos^{-1}(\mu)$

(C) $\cos^{-1}\left(\mu/2\right)$ (D) $\cos^{-1}(\mu)$

6) The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. Its focal length is 12 cm. What is the refractive index of material of lens?

(A) 1.33 (B) 1.62

(C) 1.50 (D) 2.42

7) Find equivalent focal length due to combination of two convex lens are in contact having a focal length both of them 30 cm.

(A) 15 cm (B) 30 cm

(C) 20 cm (D) 40 cm

8) A tank is filled with water to a height of 16 cm. Find the apparent depth of a needle lying at the bottom of the tank is measured by a microscope. Refractive index of water (μ_w) is $4/3$.

(A) 9.4 cm (B) 12.0 cm

(C) 10.6 cm (D) 8.0 cm

(Space for Rough Work)

$\mu = 4/3$

9) Estimate the distance for which ray optics is good approximation for an aperture of 5 mm and wavelength 500 nm?

(A) 40 m
(B) 30 m
(C) 50 m
(D) 20 m

10) The wavelength of light 500 nm is used in a Young's double-slit experiment. The distance between the slits and screen is 100 cm and the slits are separated by 1 mm. Then find distance between fifth (5^{th}) and third (3^{rd}) bright fringes.

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

11) Which of those metal having least work function (ϕ_0) among them?

(A) Mo
(B) Pb
(C) Ca
(D) Na

12) What is the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 64 volts?
[h = 6.63×10^{-34} J.s]

(A) 1.23 Å
(B) 1.87 Å
(C) 1.53 Å
(D) 1.98 Å

(Space for Rough Work)

13) In photoelectrical effect, that the graph of stopping potential (V_0) versus frequency ν is straight line. What will be the slope of this straight line?

(A) $\frac{e}{h}$

(B) V_0/e

(C) h/e

(D) $\frac{\nu}{h}$

14) What is the shortest wavelength present in the Balmer series of spectral line? [Where R is Rydberg constant]

(A) $\frac{1}{R}$

(B) $\frac{3}{R}$

(C) $\frac{2}{R}$

(D) $\frac{4}{R}$

15) The radius of the innermost electron orbit of a hydrogen atom is 5.3×10^{-11} m. What are the radii of the $n = 4$ orbit?

(A) 2.12×10^{-10} m

(B) 8.48×10^{-10} m

(C) 4.24×10^{-10} m

(D) 10.6×10^{-10} m

(Space for Rough Work)

16) The ground state energy of hydrogen atom is –13.6 eV. What will be the kinetic energies of the electron?

(A) 13.6 eV

(B) 27.2 eV

(C) –13.6 eV

(D) –27.2 eV

17) How many neutrons will produced for a given following nuclear fission reaction?

$${}^{1}_{0}n + {}^{235}_{92}U \rightarrow {}^{236}_{92}U \rightarrow {}^{144}_{56}Ba + {}^{89}_{36}Kr + (?)\,{}^{1}_{0}n$$

(A) 1

(B) 3

(C) 2

(D) 4

18) Half-life time of a radioactive element is 16 years. How much time will taken to reduce its activity 16 part?

(A) 8 years

(B) 32 years

(C) 16 years

(D) 64 years

19) What should be the ratio of neutron and proton for stability of heavy nucleus?

(A) 1 : 1

(B) 3 : 2

(C) 2 : 1

(D) 2 : 3

(Space for Rough Work)

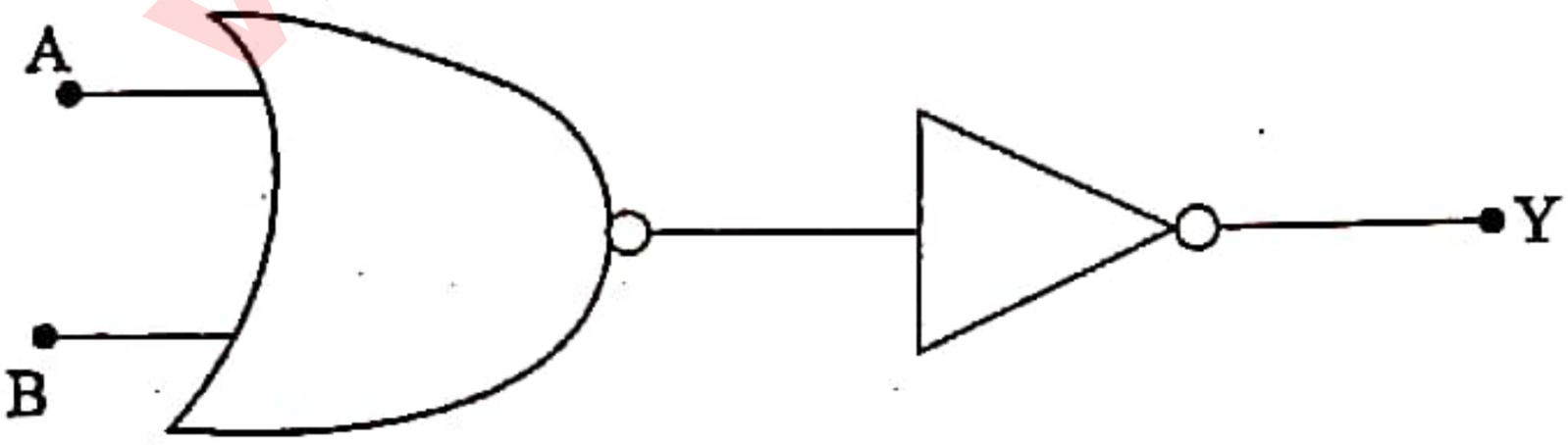
20) What is energy band gap (E_g) for p-type and n-type semiconductor use to form a LED to produce a red light colour?

(A) 3 eV
(B) 1.9 eV
(C) 1.8 eV
(D) 1.4 eV

21) In full wave rectification Input Frequency 60 Hz. What will the output frequency for that?

(A) 50 Hz
(B) 100 Hz
(C) 60 Hz
(D) 120 Hz

22) In a given following electronic logic circuit it behaves at which logic operation.



(A) AND gate
(B) NOT gate
(C) OR gate
(D) NAND gate

(Space for Rough Work)

23) Electrical field intensity due to an electric dipole on it's axis at distance $x(x >> a)$ and on the equatorial at distance $y(y >> a)$ are same. What is the ratio of x and y?

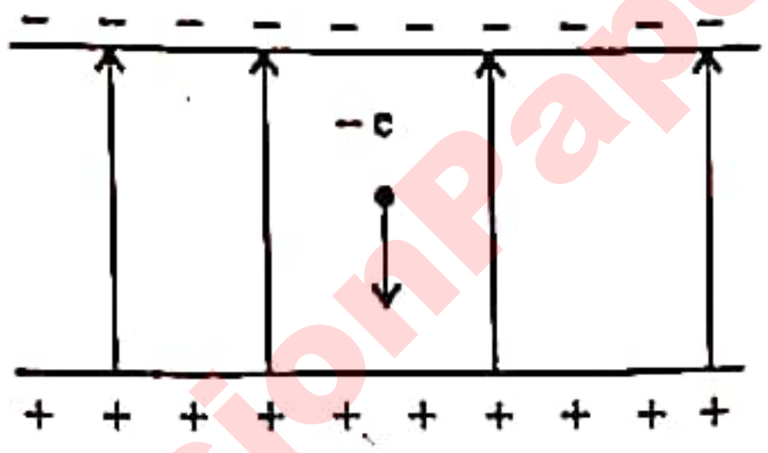
(A) $\sqrt[3]{2} : 1$

(B) $\sqrt{2} : 1$

(C) $1 : \sqrt[3]{2}$

(D) $1 : 2$

24) As shown in the following fig. an electron falls through a distance of 1.5 cm in a uniform electric field of magnitude $2.0 \times 10^4\ NC^{-1}$. Find the acceleration of the electron due to the electric field. [$e = 1.6 \times 10^{-19}$ C, $m_e = 9.1 \times 10^{-31}$ kg]



(A) $2.90 \times 10^{19}\ ms^{-2}$

(B) $1.67 \times 10^{27}\ ms^{-2}$

(C) $3.52 \times 10^{15}\ ms^{-2}$

(D) $6.62 \times 10^{34}\ ms^{-2}$

25) Two large, thin metal plates are parallel and close to each other. On their inner faces, the plates have surface charge densities of same signs and of magnitude $17.7 \times 10^{-22}\ C/m^2$. What is E in the outer region of the second plate?

(A) $4 \times 10^{-10}\ NC^{-1}$

(B) $2 \times 10^{-10}\ NC^{-1}$

(C) $1 \times 10^{-10}\ NC^{-1}$

(D) Zero

(Space for Rough Work)

26) Which of the following option gives the Dimensional Formula of Electrical Potential?

(A) $[M^{-1} L^{2} T^{-3} A^{1}]$

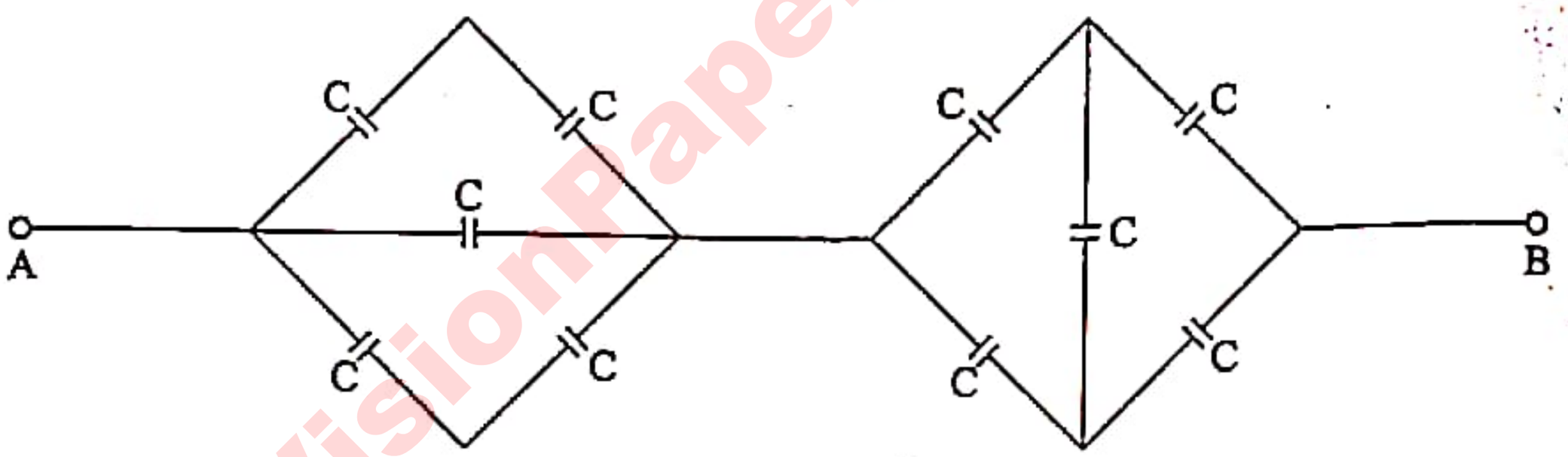
(B) $[M^{0} L^{3} T^{3} A^{-1}]$

(C) $[M^{-1} L^{-2} T^{-4} A^{2}]$

(D) $[M^{1} L^{2} T^{-3} A^{-1}]$

27) Find the equivalent capacitance between two points A & B, for given figure (electric circuit)

[Capacitance of each capacitor is $C = 3\mu F$]



(A) 1 μF

(B) 3 μF

(C) 2 μF

(D) 4 μF

28) Which of the following option is the pair of polar molecules?

(A) $[H_2O, O_2]$

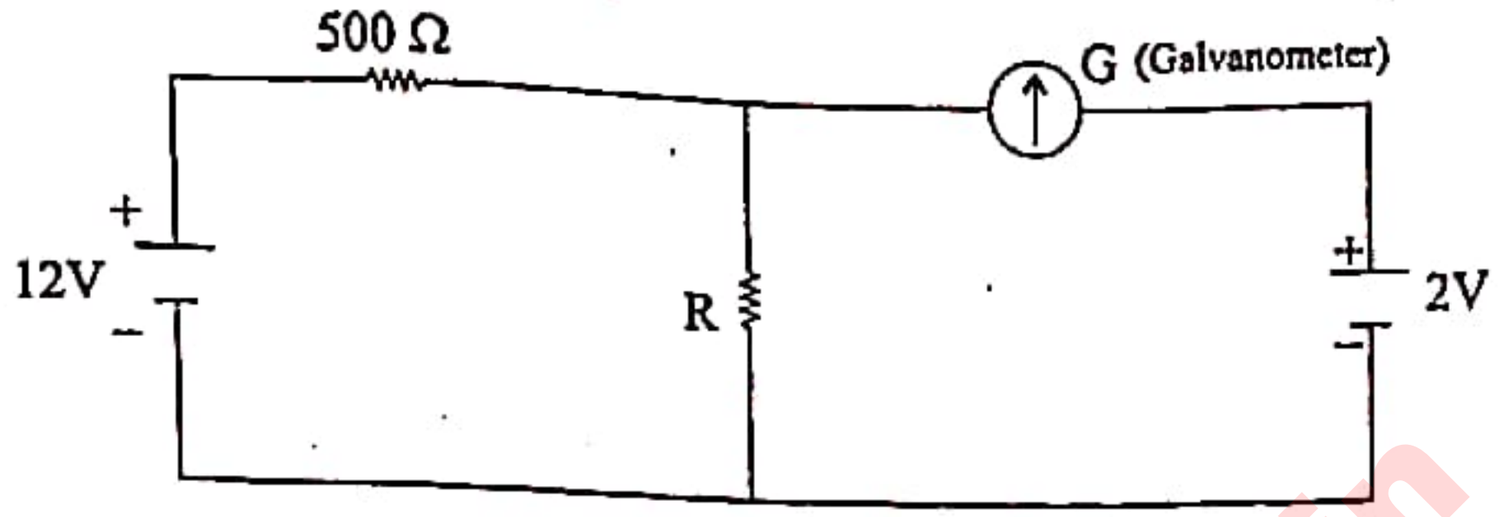
(B) $[HCl, H_2]$

(C) $[HCl, H_2O]$

(D) $[H_2, O_2]$

(Space for Rough Work)

29) For the which value of Resistance R = _____ when galvanometer shows zero deflection for following below electrical circuit.



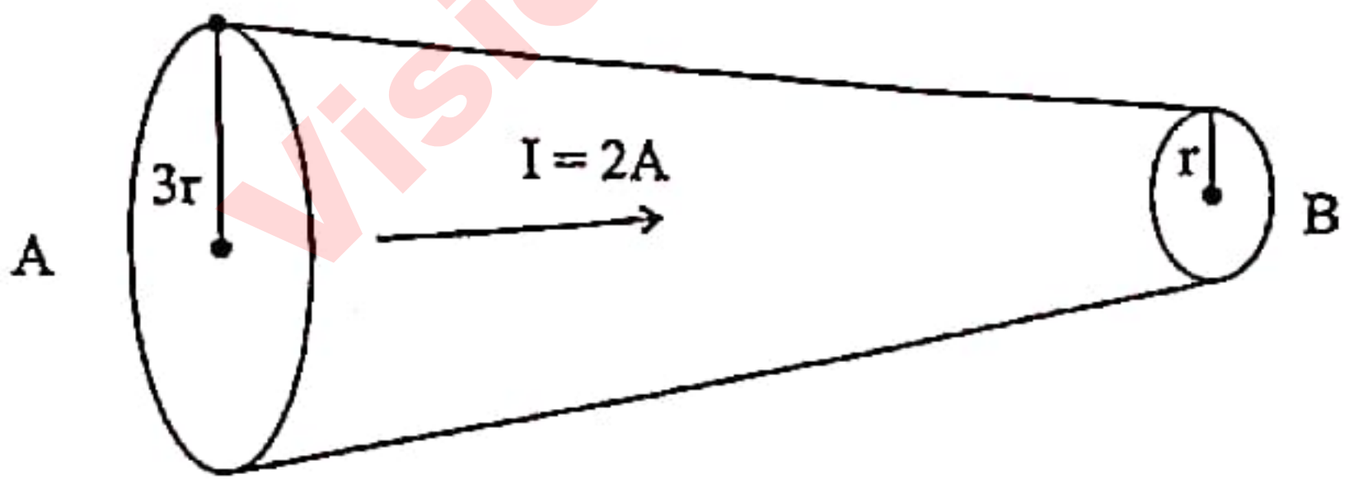
(A) 100 Ω

(B) 300 Ω

(C) 200 Ω

(D) 400 Ω

30) As following figure 2A current passing through a conducting wire, radius of cross-sectional of wire at point A is $3r$ and point B is r respectively. Then find the ratio of drift velocity at point A & B.



(A) $\frac{1}{3}$

(B) 3

(C) $\frac{1}{9}$

(D) 9

(Space for Rough Work)

31) In a potentiometer arrangement, a cell of emf 1.5 V gives a Balance point at 150 cm length of the wire. If the cell is replaced by another cell and the balance point shift to 210 cm, what is the emf of the second cell?

(A) 3.2 V

(B) 1.2 V

(C) 4.4 V

(D) 2.1 V

32) Circular loop having radius r, carrying current I, produces magnetic field at the centre loop is B. What will be the magnetic dipole moment of this loop?

(A) $\frac{4\pi Br^3}{\mu_0}$

(B) $\frac{2\pi Br^3}{\mu_0}$

(C) $\frac{\pi Br^3}{\mu_0}$

(D) $\frac{\pi Br^3}{4\mu_0}$

33) The horizontal component of the earth's magnetic field at a certain place is 3.0×10^{-5} T and the direction of the field is from the geographic south to the geographic north. A very long straight conductor is carrying a steady current of 2A. What is the force per unit length on it when it is placed on a horizontal table and the direction of the current is east to west?

(A) 3×10^{-5} N/m

(B) 9×10^{-5} N/m

(C) 6×10^{-5} N/m

(D) 2×10^{-5} N/m

(Space for Rough Work)

34) A solenoid of length 0.5 m has a radius of 1 cm and is made up of 1000 turns. It carries a current of 10A. What is the magnitude of the magnetic field inside the solenoid?

(A) 6.28×10^{-3} T
(B) 2.51×10^{-2} T
(C) 1.71×10^{-2} T
(D) 7.23×10^{-3} T

35) At certain place on the surface of the earth, horizontal component of earth's magnetic field is same as vertical component of earth magnetic field, then what will be angle of dip at that place?

(A) 30°
(B) 60°
(C) 45°
(D) 90°

36) What is the magnitude of the equatorial fields due to a bar magnet of length 5.0 cm at a distance 75 cm from its mid point? The magnetic moment of the bar magnet is 0.75 Am^2.

(A) 3.2×10^{-7} T
(B) 1.78×10^{-7} T
(C) 6.4×10^{-7} T
(D) 3.56×10^{-7} T

37) For a long current carrying solenoid having inside magnetic field is 0.6 T. Then find the magnetic energy per unit volume is _____.

(A) 1.43×10^5 J/m^3
(B) 5.23×10^4 J/m^3
(C) 2.86×10^4 J/m^3
(D) Zero

(Space for Rough Work)

38) The self inductance L of a solenoid of length *l* and area of cross-section A increase _____. (Here, with fixed number of turns N).

(A) *l* and A increase

(B) *l* increases and A decreases

(C) *l* decreases and A increases

(D) Both *l* and A decrease

39) A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 sec. what is the change of flux linkage with the other coil?

(A) 15 Wb

(B) 45 Wb

(C) 30 Wb

(D) 60 Wb

40) A 50 μF capacitor is connected to a 110V, 60 Hz ac supply. Determine the rms value of the current in the circuit.

(A) 5.2 A

(B) 2.5 A

(C) 3.8 A

(D) 2.1 A

(Space for Rough Work)

C = 50 μF
V = 110 V
f = 60 Hz

CHEMISTRY

41) Which halogen element gives Halous acid type of oxoacid?

(A) F
(B) Br
(C) Cl
(D) I

42) Which is used for manufacture of steel?

(A) Dihydrogen
(B) Dinitrogen
(C) Dioxygen
(D) Dichlorine

43) If atomic number of element is 26, then magnetic moment is _____ BM of its divalent aqueous ion?

(A) 1.73
(B) 3.87
(C) 2.83
(D) 4.90

44) Which product is obtained during reaction of MnO_4^- with I^- in faintly alkaline condition?

(A) I_2
(B) IO_3^-
(C) IO^-
(D) IO_4^-

(Space for Rough Work)

$\sqrt{(2c+2)}$

45) Which is not act as ligand?

(A) NO

(B) $H_2NCH_2CH_2NH_2$

(C) NH_4^+

(D) CO

46) Which is correct formula for pentaaminecarbonatocobalt (III) chloride coordination compound?

(A) $[Co(NH_3)_5(CO_3)]Cl$

(B) $[Co(NH_3)_5(CO_2)]Cl$

(C) $[Co(NH_3)_5(CO_3)]Cl_2$

(D) $[Co(NH_2)_5(CO_3)]Cl$

47) Which type of Isomerism in isomers $[Co(NH_3)_5(SO_4)]Br$ and $[Co(NH_3)_5Br]SO_4$?

(A) Linkage

(B) Ionisation

(C) Coordination

(D) Solvate

48) $CH_3CH=CHC(Cl)(CH_3)_2$ is which type of halide based on position of –Cl?

(A) Allylic

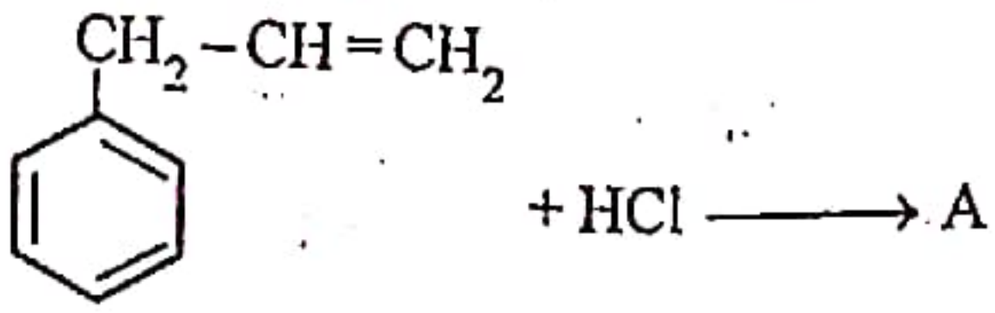
(B) Secondary

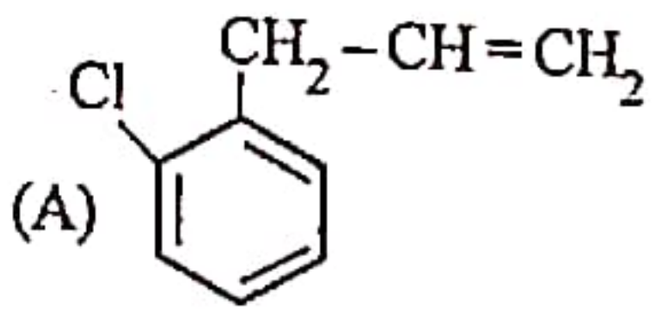
(C) Vinylic

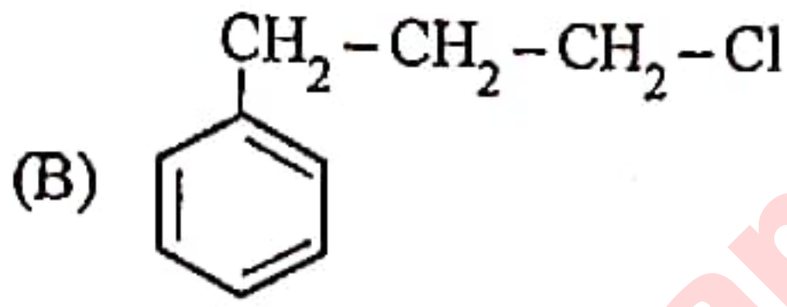
(D) Aryl

(Space for Rough Work)

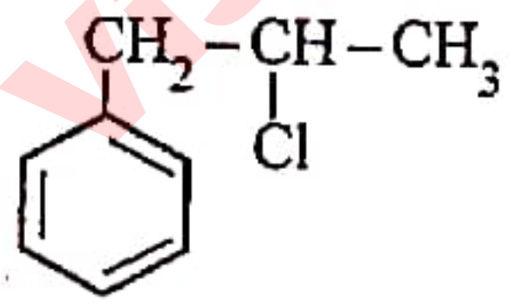
49) What is A in following reaction?



(A) 

(B) 

(C) 

(D) 

50) Which would undergo S_N1 reaction faster from following?

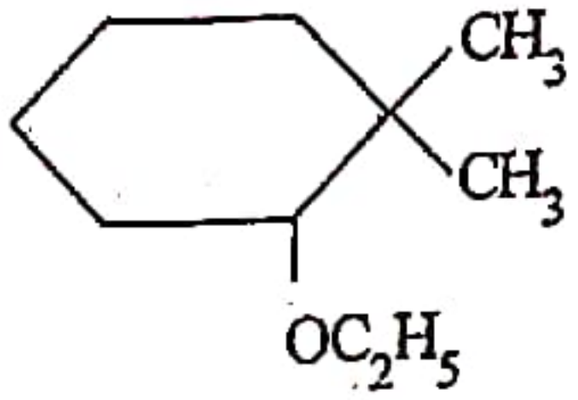
(A) Chloromethane

(B) 2-bromo-3-methylbutane

(C) 2-chloro-3-methylbutane

(D) 2-bromo-2-methylpropane

(Space for Rough Work)

51) From following, IUPAC name of compound  is?

(A) 2-ethoxy-1, 1-dimethyl cyclohexane

(B) 5-ethoxy-6, 6-dimethyl cyclohexane

(C) 1-ethoxy-2, 2-dimethyl cyclohexane

(D) 1-ethoxy-6, 6-dimethyl cyclohexane

52) Which Grignard reagent gives 2-methylpropan-1-ol with reaction with methanal?

(A) $CH_3-CH_2-CH_2-Mg-X$

(B) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-Mg-X$

(C) $CH_3-CH=CH-Mg-X$

(D) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-Mg-X$

53) Which compound having maximum value of pKa from following?

(A) $o-O_2N-C_6H_4-OH$

(B) $p-O_2N-C_6H_4-OH$

(C) $m-O_2N-C_6H_4-OH$

(D) C_6H_5OH

(Space for Rough Work)

54) Which reagent is used to convert Allyl alcohol to propenal?

(A) PCC

(B) O_3/H_2O - Zn (Powder)

(C) DIBAL-H

(D) All above

55) Which compound give Cannizzaro reaction from following?

(A) CH_3CHO

(B) CH_2ClCHO

(C) CCl_3CHO

(D) $CHCl_2CHO$

56) Which compound having maximum acidic strength of the following?

(A) 4-methoxy benzoic acid

(B) 2-methoxy benzoic acid

(C) Benzoic acid

(D) 4-nitrobenzoic acid

57) 2° - Amine is obtained by reduction of which compound?

(A) Nitrile

(B) Nitro

(C) Isonitrile

(D) Amide

(Space for Rough Work)

58) Hinsberg's reagent do not react with which amine?

(A) Only 1° - amine

(B) Only 3° - amine

(C) Only 2° - amine

(D) 1° and 2° - amine

59) Which product is obtained by nitration of aniline?

(A) o-nitroaniline

(B) m-nitroaniline

(C) p-nitroaniline

(D) All above

60) Which reaction prove that all the six carbon atoms are linked in a straight chain in glucose?

(A) Heat with HI

(B) Reaction with Br_2

(C) Reaction with NH_2OH

(D) Reaction with HCN

(Space for Rough Work)

61) Which α-amino acid is not optical isomer?

(A) Alanine (B) Glycine

(C) Lysine (D) Leucine

62) In DNA, which bases is not present of following?

(A) Thymine

(B) Guanine

(C) Uracil

(D) Adenine

63) Which is network solid from following?

(A) SiC (B) $I_{2(s)}$

(C) $CO_{2(s)}$ (D) $H_2O_{(s)}$

64) The edge lengths of the unit cells in terms of the radius r of spheres constitutin fcc, bcc and simple cubic unit cell are respectively _____.

(A) $\frac{4r}{\sqrt{3}}, 2\sqrt{2}r, 2r$ (B) $2r, 2\sqrt{2}r, \frac{4r}{\sqrt{3}}$

(C) $2r, \frac{4r}{\sqrt{3}}, 2\sqrt{2}r$ (D) $2\sqrt{2}r, \frac{4r}{\sqrt{3}}, 2r$

(Space for Rough Work)

65) Atoms of element X form hcp lattice and those of the element Y occupy 75% of tetrahedral voids. What is the formula of the compound formed by elements X and Y?

(A) X_4Y_3 (B) X_3Y_4

(C) X_2Y_3 (D) X_3Y_2

66) Which of the following aqueous solutions should have the minimum boiling point?

(A) 0.1 M Urea

(B) 0.1 M K_2SO_4

(C) 0.1 M NaCl

(D) 0.1 M $FeCl_3$

67) 3.0 gram ethanoic acid in 50 gram benzene having _____ molality?

(Atomic weights : H = 1, C = 12, O = 16).

(A) 0.1 (B) 1.0

(C) 0.6 (D) 0.06

68) Which method is used to remove salts from sea water?

(A) Hydraulic washing

(B) Leaching

(C) Reverse osmosis

(D) Froth Floatation

(Space for Rough Work)

69) Which products are obtained during electrolysis of aqueous solution of sodium chloride?

(A) $NaOH, O_2$ and H_2

(B) NaOH, Na and H_2

(C) $NaOH, Cl_2$ and H_2

(D) Na, Cl_2 and H_2

70) Using the data given below find out the strongest reducing agent?

$E^{o}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33\,V$ $\quad$ $E^{o}_{Cl_2/Cl^-} = 1.36\,V$

$E^{o}_{MnO_4^-/Mn^{2+}} = 1.51\,V$ $\quad$ $E^{o}_{Cr^{3+}/Cr} = -0.74\,V$

(A) Cl^- $\quad$ (B) Cr^{3+}

(C) Cr $\quad$ (D) Mn^{2+}

71) Which is symbolic representation for following cell reaction, $Mg_{(s)} + Cl_{2(g)} \rightarrow Mg^{2+}_{(aq)} + 2Cl^-_{(aq)}$.

(A) $Mg\,|Mg^{2+}_{(aq)}(1M)||Cl^-_{(aq)}(1M)|Cl_{2(g)}(1bar)|Pt$

(B) $Pt\,|Cl^-_{(aq)}(1M)|Cl_{2(g)}(1bar)||\,Mg^{2+}_{(aq)}(1M)|Mg$

(C) $Mg\,|Mg^{2+}_{(aq)}(1M)||Cl_{2(g)}(1bar)|Cl^-_{(aq)}(1M)|Pt$

(D) $Pt\,|Cl_{2(g)}(1bar)|Cl^-_{(aq)}(1M)||Mg^{2+}_{(aq)}(1M)|Mg$

(Space for Rough Work)

Nacl + H_2O
NaOH + Cl_2 + H_2

72) For a reaction, $K = 4.5 \times 10^{-4}\ L\ mol^{-1}\ s^{-1}$. What is order of reaction?

(A) Zero

(B) Second

(C) First

(D) Third

73) For first order reaction, the value of slope for graph of $\log \frac{[R]_0}{[R]} \rightarrow t$ is _____.

(A) $\frac{K}{2.303}$

(B) $\frac{2.303}{K}$

(C) $-K$

(D) $-\frac{K}{2.303}$

74) The rate constant for a first order reaction is $60\ s^{-1}$. How much second will it take to reduce the initial concentration of the reactant to its $\frac{1}{16}$th value?

(A) 2.3×10^{-2}

(B) 9.5×10^{-2}

(C) 4.6×10^{-2}

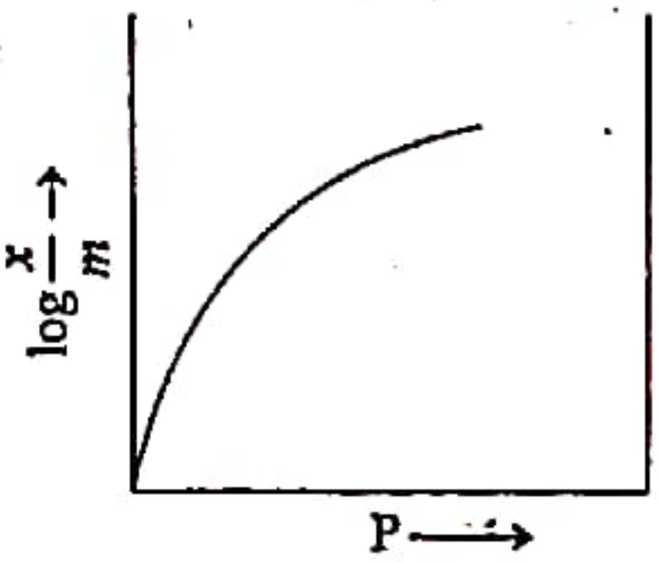
(D) 6.9×10^{-2}

(Space for Rough Work)

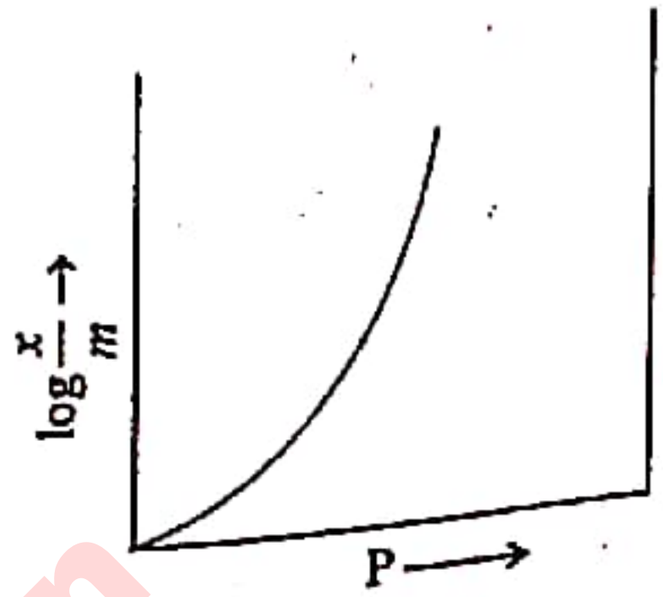
$K = 60\ s^{-1}$

75) Which is Freundlich Adsorption isotherm?

(A)



(B)



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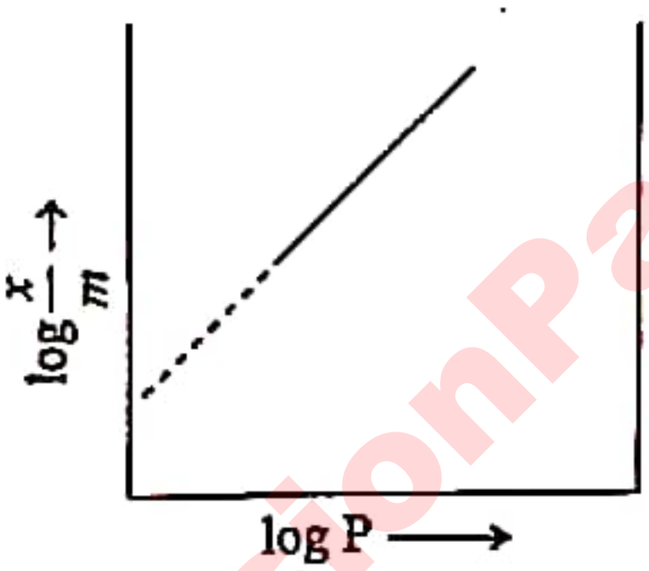

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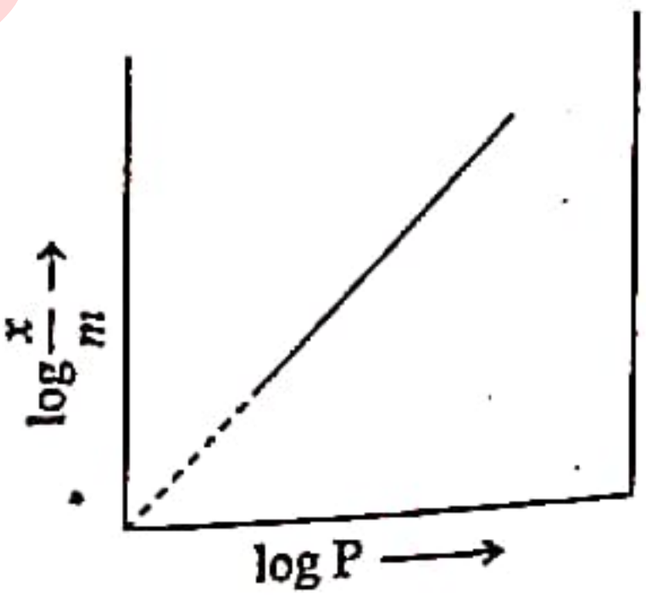

76) Which method is used to prepare colloids?

$As_2O_3 + 3H_2S \rightarrow As_2S_3(sol) + 3H_2O$

(A) Oxidation

(B) Hydrolysis

(C) Reduction

(D) Double decomposition

(Space for Rough Work)

77) Which of the following ions will have maximum flocculating power for coagulation of As_2S_3 sol?

(A) Na^+ (B) Al^{3+}

(C) Mg^{2+} (D) Ba^{2+}

78) Which metals are purified by vapour phase refining for following?

(A) Ni, Fe (B) Zr, Sn

(C) Ag, Ni (D) Ni, Zr

79) Copper matte is a mixture of which substances?

(A) $Cu_2O + FeS$ (B) $Cu_2S + FeO$

(C) $Cu_2S + FeS$ (D) $FeO + CuO$

80) Very pure dinitrogen can be obtained by the thermal decomposition of which substance?

(A) Sodium azide

(B) Ammonium dichromate

(C) Ammonium nitrite

(D) Barium nitrite

(Space for Rough Work)