PCE-2011

A

Test Booklet Code **A** **Test Booklet No.** **190445**

This booklet contains 24 pages.
DO NOT open this Test Booklet until you are asked to do so.

Important Instructions :-

1. The PHYSICS 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 mark is **80**.
2. The Test is of **2 hours** duration.
3. Use **Black Ball Point Pen only** for writing particulars on OMR Answer Sheet marking ● responses.
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 CODE for this Booklet is **A**. Make sure that the CODE 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 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) be deemed not to have handed over the Answer Sheet and 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 candidate will write the Correct Test Booklet Code 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 Code : ..... Test Booklet No. : .....

Candidate's Sign ..... *Block Supdt. Sign* .....

PHYSICS

1. A hollow metal sphere of radius 10 cm is charged such that the potential on its surface becomes 80 volt. The potential at the centre of the sphere is ....

(A) 80 volt (B) 800 volt

(C) 8 volt (D) Zero

2. Charges 5 μC and 10 μC are placed 1 m. apart. Work done to bring these charges at a distance 0.5 m. from each other is ..... ($K = 9 \times 10^9$ S.I.)

(A) 9×10^4 J (B) 18×10^4 J

(C) 45×10^{-2} J (D) 9×10^{-1} J

3. The unit of physical quantity obtained by the line integral of electric field is ...

(A) NC^{-1} (B) Vm^{-1}

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

4. There exists an electric field of 1 N/C along Y direction. The flux passing through the square of 1 m placed in XY plane inside the electric field is .....

(A) 1.0 Nm^2 / C (B) 10.0 Nm^2 / C

(C) 2.0 Nm^2 / C (D) Zero

5. Charge q_2 of mass m revolves around a stationary charge q_1 in a circular orbit of radius r. The orbital periodic time of q_2 would be .....

(A) $\left[\frac{4\pi^2 mr^3}{kq_1q_2}\right]^{1/2}$ (B) $\left[\frac{kq_1q_2}{4\pi^2 mr^3}\right]^{1/2}$

(C) $\left[\frac{4\pi^2 mr^4}{kq_1q_2}\right]^{1/2}$ (D) $\left[\frac{4\pi^2 mr^2}{kq_1q_2}\right]^{1/2}$

(Space for Rough Work)

6. The Gaussian surface for calculating the electric field due to a charge distribution is ....

(A) any surface near the charge distribution.

(B) always a spherical surface.

(C) a symmetrical closed surface containing the charge distribution, at every point of which electric field has a single fixed value.

(D) None of the given options.

7. To send 10% of main current through a Moving Coil Galvanometer of resistance 99 Ω, shunt required is .....

(A) 9 Ω (B) 11 Ω

(C) 10 Ω (D) 9.9 Ω

8. The resistance of ideal Voltmeter is .....

(A) Zero (B) Greater than zero but finite value.

(C) Infinite (D) 5000 Ω

9. The emf of a thermocouple, cold junction of which is kept at – 300°C is given by $E = 40\,t + \frac{1}{10}t^2$. The temperature of inversion of thermocouple will be .....

(A) 200°C (B) 400°C

(C) – 200°C (D) – 100°C

10. The maximum power dissipated in an external resistance R, when connected to a cell of emf E and internal resistance r, will be .....

(A) $\frac{E^2}{r}$ (B) $\frac{E^2}{2r}$

(C) $\frac{E^2}{3r}$ (D) $\frac{E^2}{4r}$

(Space for Rough Work)

11. A magnetic wire of dipole moment 4π Am^2 is bent in the form of semi-circle. The new magnetic moment is .....

(A) 4π Am^2 (B) 8π Am^2

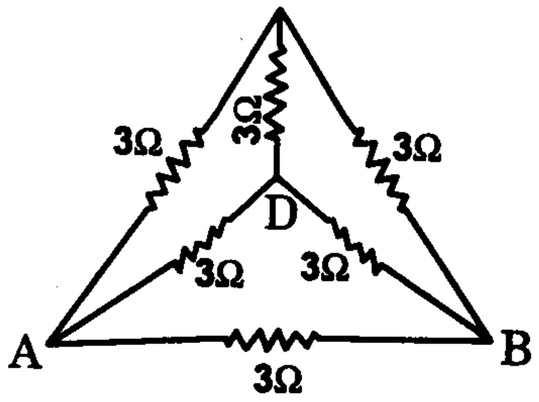
(C) 4 Am^2 (D) None of these

12. The masses of the three wires of Copper are in the ratio 5 : 3 : 1 and their lengths are in the ratio 1 : 3 : 5. The ratio of their electrical resistances is .....

(A) 5 : 3 : 1 (B) $\sqrt{125}$: 15 : 1

(C) 1 : 15 : 125 (D) 1 : 3 : 5

13. The equivalent resistance between A and B in the given circuit is .....



(A) 3 Ω (B) 6 Ω

(C) 12 Ω (D) 1.5 Ω

14. The magnetic field due to short bar magnet of magnetic dipole moment M and length $2l$, on the axis at a distance z (where $z >> l$) from the centre of the magnet is given by formula .....

(A) $\frac{\mu_0 M}{4\pi z^3}\hat{M}$ (B) $\frac{2\mu_0 M}{4\pi z^3}\hat{M}$

(C) $\frac{4\pi M}{\mu_0 z^3}\hat{M}$ (D) $\frac{\mu_0 M}{2\pi z^3}\hat{M}$

(Space for Rough Work)

15. Resultant force acting on a diamagnetic material in a magnetic field is in direction .....

(A) from stronger to the weaker part of the magnetic field.

(B) from weaker to the stronger part of the magnetic field.

(C) perpendicular to the magnetic field.

(D) in the direction making 60° to the magnetic field.

16. Magnetic flux of 10 μ Wb is linked with a coil, when a current of 2 mA flows through it. What is the self inductance of the coil?

(A) 10 mH (B) 5 mH

(C) 15 mH (D) 20 mH

17. What is the self inductance of a solenoid of length 31.4 cm., area of cross section $10^{-3}m^2$ and total number of turns 10^3 ?

(A) 4 mH (B) 4 H

(C) 40 H (D) 0.4 H

18. What should be the value of self inductance of an inductor that should be connected to 220 V, 50 Hz supply so that a maximum current of 0.9 A flows through it ?

(A) 11 H (B) 2 H

(C) 1.1 H (D) 5 H

(Space for Rough Work)

19. The peak value of an alternating current is 5 A and its frequency is 60 Hz. Find its rms value and time taken to reach the peak value of current starting from zero.

(A) 3.536 A ; 4.167 ms (B) 3.536 A ; 15 ms

(C) 6.07 A ; 10 ms (D) 2.536 A ; 4.167 ms

20. A bar magnet is placed in the position of stable equilibrium in a uniform magnetic field of induction B. If it is rotated through an angle 180°, then the work done is ..... (M = Magnetic Dipole moment of Bar magnet)

(A) MB (B) 2 MB

(C) $\frac{MB}{2}$ (D) Zero

21. Refractive index of the material of a prism is 1.5. If $\delta_m = A$, what will be a value of angle of the given prism ?

(where δ_m = minimum deviation; A = angle of prism)

(A) 82.8° (B) 41.4°

(C) 48.6° (D) 90°

22. Where should a person stand straight from the pole of a convex mirror of focal length 2.0 m. on its axis so that the image formed become half of his original height ?

(A) – 2.60 m (B) – 4.0 m

(C) – 0.5 m (D) – 2.0 m

23. In Hertz's experiment, the rods connected with an induction coil behave as ....

(A) an inductor (B) capacitor

(C) resistor (D) an induction coil

(Space for Rough Work)

24. A transparent plastic bag filled with air forms a concave lens. Now, if this bag is completely immersed in water, then it behaves as .....

(A) Divergent lens
(B) Convergent lens
(C) Equilateral prism
(D) Rectangular slab

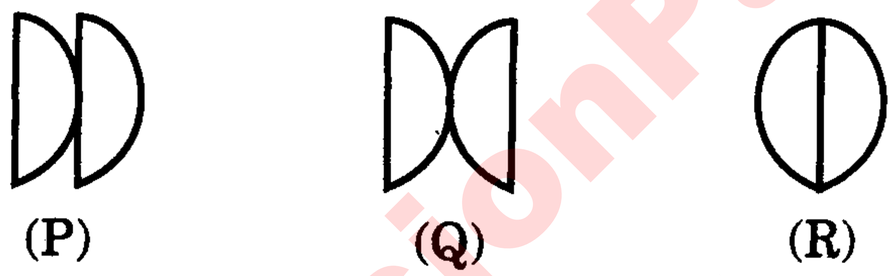
25. A microscope is focussed on an ink mark on the top of a table. If we place a glass slab of 3 cm thick on it, how should the microscope be moved to focus the ink spot again ? The refractive index of glass is 1.5.

(A) 2 cm upwards
(B) 2 cm downwards
(C) 1 cm upwards
(D) 1 cm downwards

26. A Young's double slit set up for interference is shifted from air to within water, then the fringe width .....

(A) Becomes infinite
(B) Decreases
(C) Increases
(D) Remain unchanged

27. Given figures show the arrangements of two lenses. The radii of curvature of all the curved surfaces are same. The ratio of the equivalent focal length of combinations P, Q and R is .....



(A) 1 : 1 : 1
(B) 1 : 1 : –1
(C) 2 : 1 : 1
(D) 2 : 1 : 2

(Space for Rough Work)

28. An electron is accelerated under a potential difference of 182 V. The maximum velocity of electron will be .....

(Charge of electron is 1.6×10^{-19} C and its mass is 9.1×10^{-31} kg)

(A) 5.65×10^6 m/s

(B) 4×10^6 m/s

(C) 8×10^6 m/s

(D) 16×10^6 m/s

29. The total energy of electron in the second excited state is -2 E. What is its potential energy in the same state with proper sign ?

(A) -2 E

(B) -4 E

(C) 4 E

(D) $-$ E

30. An electron and a proton are moving in the same direction with same kinetic energy. The ratio of the De Broglie wavelength associated with these particles is .....

(A) $\frac{m_e}{m_p}$

(B) $\frac{m_p}{m_e}$

(C) $\sqrt{\frac{m_p}{m_e}}$

(D) $m_p \cdot m_e$

31. A photosensitive metallic surface has work function ϕ . If photon of energy 3ϕ fall on this surface, the electron comes out with a maximum velocity of 6×10^6 m/s. When the photon energy is increased to 9ϕ , then maximum velocity of photoelectron will be .....

(A) 12×10^6 m/s

(B) 6×10^6 m/s

(C) 3×10^6 m/s

(D) 24×10^6 m/s

(Space for Rough Work)

32. The radioactivity of a sample is I_1 at a time t_1 and I_2 at a time t_2. If the half life of the sample is $\tau_{1/2}$, then the number of nuclei that have disintegrated in the time $t_2 - t_1$ is proportional to .....

(A) $I_1 t_2 - I_2 t_1$ (B) $I_1 - I_2$

(C) $\frac{I_1 - I_2}{\tau_{1/2}}$ (D) $(I_1 - I_2)\,\tau_{1/2}$

33. According to the Bohr's atomic model, the relation between principal quantum number (n) and radius of orbit (r) is .....

(A) $r \propto n^2$ (B) $r \propto \frac{1}{n^2}$

(C) $r \propto \frac{1}{n}$ (D) $r \propto n$

34. The frequency of a Photon having energy 100 eV is ..... Hz.

(Take $h = 6.62 \times 10^{-34}$ J s ; $1 \text{ eV} = 1.6 \times 10^{-19}$ J)

(A) 2.417×10^{-16} (B) 2.417×10^{16}

(C) 2.417×10^{17} (D) 10.54×10^{17}

35. Reverse bias applied to a P-N junction diode .....

(A) lowers the potential barrier.

(B) decreases the majority charge carriers.

(C) raises the potential barrier.

(D) change the mass of P-N junction diode.

(Space for Rough Work)

36. The current gain of a common base transistor circuit is 0.96. On changing the emitter current by 10.0 mA, the change in the base current will be .....

(A) 9.6 mA (B) 0.4 mA

(C) 19.6 mA (D) 24 mA

37. What should be minimum length of antenna for efficient transmission of signals of wavelength λ ?

(A) $\lambda/2$ (B) $\lambda/3$

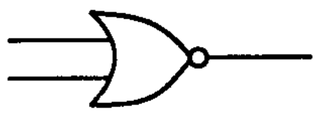
(C) $\lambda/4$ (D) $\lambda/5$

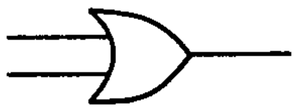
38. What fraction of the surface area of Earth can be covered to establish communication by one geostationary satellite ?

(A) $1/2$ (B) $1/3$

(C) $1/4$ (D) $1/8$

39. Symbolic representation of NOR gate is .....

(A)  (B) 

(C)  (D) 

40. A T.V. tower has a height 150 m. What is the total population covered by the T.V. tower, if the population density around the T.V. tower is $10^3\ km^{-2}$?

Radius of the Earth is 6.4×10^6 m.

(A) 60.288 lakhs (B) 40.192 lakhs

(C) 100 lakhs (D) 20.228 lakhs

(Space for Rough Work)

(Space for Rough Work)

41. Calculate the velocity of an electron having wavelength of 0.15 nm.

Mass of an electron is 9.109×10^{-28} grams. ($h = 6.626 \times 10^{-27}$ erg-second).

(A) 2.062×10^{-8} cm. sec.$^{-1}$ (B) 2.062×10^{-15} cm. sec.$^{-1}$

(C) 2.062×10^{-10} cm. sec.$^{-1}$ (D) 2.062×10^{-9} cm. sec.$^{-1}$

42. Which of the following is correct for number of electrons, number of orbitals and type of orbitals respectively in N orbit ?

(A) 4, 4 and 8 (B) 4, 8 and 16

(C) 32, 16 and 4 (D) 4, 16 and 32

43. The First order reflection ($n = 1$) from a crystal of the X-ray from a Copper anode tube ($\lambda = 1.54$ Å) occurs at an angle of 45°. What is the distance between the set of plane causing the diffraction ?

(A) 0.1089 nm. (B) 0.1089 m.

(C) 10.89 Å (D) 1.089×10^{-9} m.

44. If in a crystal lattice of a compound, each corner of a cube is enjoyed by Sodium, each edge of a cube has Oxygen and centre of cube is enjoyed by Tungsten (W), then give its formula.

(A) Na_2WO_4 (B) $NaWO_3$

(C) Na_3WO_3 (D) Na_2WO_3

(Space for Rough Work)

45. How many grams of Sulphuric acid is to be dissolved to prepare 200 ml. aqueous solution having concentration of $[H_3O^+]$ ions 1 M at 25°C temperature.

[H=1, O=16, S=32 gram . $mole^{-1}$]

(A) 4.9 gram

(B) 19.6 gram

(C) 9.8 gram

(D) 0.98 gram

46. Choose the correct statement :

When concentration of a salt solution is increased .....

(A) Boiling point increases while vapour pressure decreases.

(B) Boiling point decreases while vapour pressure increases.

(C) Freezing point decreases while vapour pressure increases.

(D) Freezing point increases while vapour pressure decreases.

47. A container of 1.0 lit. capacity filled with 1.0 mole of ideal gas is connected to an evacuated vessel of 9.0 lit. Calculate change in Entropy. (R = 1.987 Cal.)

(A) 0.188 Cal. K^{-1} mol^{-1}

(B) 0.4576 Cal. K^{-1} mol^{-1}

(C) 4.576 Cal. K^{-1} mol^{-1}

(D) 4.366 Cal. K^{-1} mol^{-1}

48. Final pressure is higher than initial pressure of a container filled with an ideal gas at constant temperature. What will be the value of equilibrium constant ?

(A) K = 1.0

(B) K = 10.0

(C) K > 1.0

(D) K < 1.0

(Space for Rough Work)

49. Two different electrolytic cells filled with molten $Cu(NO_3)_2$ and molten $Al(NO_3)_3$ respectively are connected in series. When electricity is passed 2.7 gram Al is deposited on electrode. Calculate the weight of Cu deposited on cathode. [Cu = 63.5 ; Al = 27.0 gram . mol^{-1}]

(A) 190.5 gram (B) 9.525 gram

(C) 63.5 gram (D) 31.75 gram

50. Which of the following reactions is correct for a given electro chemical cell at 25°C ?

$Pt / Br_{2(g)} / Br^-_{(aq)} // Cl^-_{(aq)} / Cl_{2(g)} / Pt.$

(A) $2Br^-_{(aq)} + Cl_{2(g)} \rightarrow 2Cl^-_{(aq)} + Br_{2(g)}$

(B) $Br_{2(g)} + 2Cl^-_{(aq)} \rightarrow 2Br^-_{(aq)} + Cl_{2(g)}$

(C) $Br_{2(g)} + Cl_{2(g)} \rightarrow 2Br^-_{(aq)} + 2Cl^-_{(aq)}$

(D) $2Br^-_{(aq)} + 2Cl^-_{(aq)} \rightarrow Br_{2(g)} + Cl_{2(g)}$

51. What will be pH of aqueous solution of electrolyte in electrolytic cell during electrolysis of $CuSO_{4\,(aq)}$ between graphite electrodes ?

(A) pH = 14.0 (B) pH > 7.0

(C) pH < 7.0 (D) pH = 7.0

52. For a First order reaction, the initial concentration of a reactant is 0.05 M. After 45 minutes it is decreased by 0.015 M. Calculate half reaction time. ($t_{1/2}$)

(A) 87.42 min. (B) 25.90 min.

(C) 78.72 min. (D) 77.20 min.

(Space for Rough Work)

53. Give relation between half reaction time ($t_{1/2}$) and initial concentration of reactant for $(n-1)$ order reaction.

(A) $t_{1/2} \propto [R]_0$

(B) $t_{1/2} \propto [R]_0^{2-n}$

(C) $t_{1/2} \propto [R]_0^{n+1}$

(D) $t_{1/2} \propto [R]_0^{n-2}$

54. Which of the following has maximum coagulation power with Ferric hydroxide Sol ?

(A) Cryolite

(B) $K_2C_2O_4$

(C) $K_3[Fe(CN)_6]$

(D) $K_4[Fe(CN)_6]$

55. Which of the following enzymes is present in animals like cow, buffaloes, etc. to digest compound like paper, cloth, etc.?

(A) Uraze

(B) Cellulase

(C) Silicones

(D) Sucrase

56. Stoichiometric ratio of Sodium di hydrogen orthophosphate and Sodium hydrogen orthophosphate required for synthesis of $Na_5P_3O_{10}$ is .....

(A) 1.5 : 3

(B) 3 : 1.5

(C) 1 : 1

(D) 2 : 3

(Space for Rough Work)

57. Number of non-bonding electron pair on Xe in XeF_6 , XeF_4 and XeF_2 respectively will be .....

(A) 6, 4, 2 (B) 1, 2, 3

(C) 3, 2, 1 (D) 0, 3, 2

58. Copper exhibits only +2 oxidation state in its stable compounds. Why ?

(A) Copper is transition metal in +2 state.

(B) +2 state compounds of Copper are formed by exothermic reactions.

(C) Electron configuration of Copper in +2 state is [Ar]$3d^9\ 4s^0$.

(D) Copper gives coloured compounds in +2 state.

59. When dil. H_2SO_4 is added to aqueous solution of Potassium chromate, yellow colour of solution turns to orange colour. It indicates .....

(A) Chromate ions are reduced.

(B) Chromate ions are oxidised.

(C) Mono centric complex is converted into dicentric complex.

(D) Oxygen gets removed from chromate ions.

60. German silver alloy contains .....

(A) Zinc, Silver and Copper (B) Nickel, Silver and Copper

(C) Germanium, Silver and Copper (D) Zinc, Nickel and Copper

(Space for Rough Work)

61. Ammonia gas does not evolve from the complex $FeCl_3 \cdot 4NH_3$ but it gives white precipitate with aqueous solution of $AgNO_3$. Co-ordination number of central metal ion in above complex is six. Give IUPAC name of the complex.

(A) Ammonium trichloro triammine ferrum (III).

(B) Tetra ammine ferrum (III) chloride.

(C) Dichloro tetra ammine ferrate (II) chloride.

(D) Dichloro tetra ammine ferrum (III) chloride.

62. Experimental value of magnetic momentum of Mn^{+2} complex is 5.96 B.M. This indicates .....

(A) Axial and orbital motion of electron in same direction.

(B) Axial and orbital motion of electron in opposite direction.

(C) Electron does not exhibit orbital motion, it only exhibits axial motion.

(D) Electron does not exhibit axial motion, it only exhibits orbital motion.

63. Which of the following ratio will give stability to daughter element, when radioactive parent element has less number of protons compared to number of neutrons ?

(A) $\frac{N+1}{Z+1}$ (B) $\frac{N-1}{Z+1}$

(C) $\frac{N-1}{Z-1}$ (D) $\frac{N+1}{Z-1}$

64. ${}^{7}_{3}Li + A \rightarrow {}^{4}_{2}He + B$. A and B are respectively .....

(A) (D, α) (B) (α, n)

(C) (n, α) (D) (P, α)

(Space for Rough Work)

65. Which of the following compounds exhibit rotamers ?

(A) 2 - butene

(B) Maleic acid

(C) Butane

(D) Fumeric acid

66. Which of the compounds when brominated turns to meso 2, 3 di bromobutane ?

(A) cis 2 - butene

(B) Iso butane

(C) Butane

(D) Trans 2 - butene

67. Hybridisation shown by Carbon and Oxygen of –OH group in Phenol are respectively .....

(A) sp^2, sp^2

(B) sp^3, sp^3

(C) sp, sp^2

(D) sp^2, sp^3

68. Chlorobenzene $\xrightarrow[X]{\text{Reaction}}$ Phenol $\xrightarrow[Y]{\text{Reaction}}$ Salicylaldehyde.

X and Y reactions are respectively .....

(A) Fries rearrangement and Kolbe-Schmitt.

(B) Cumene and Reimer-Tiemann.

(C) Dow and Reimer-Tiemann.

(D) Dow and Friedel-Craft.

(Space for Rough Work)

69. Which of the following reactions convert Acetone into Hydrocarbon having same number of Carbon atoms ?

(A) Wolff-Kishner reaction
(B) Hofmann reaction
(C) Grignard reaction
(D) Reduction with $LiAlH_4$

70. Give IUPAC name of the product, when Acetamide is heated with anhydrous Phosphorous pentoxide.

(A) Ethyl amine
(B) Propane nitrile
(C) Cyano methane
(D) Ethane nitrile

71. Which of the following is neucliophilic addition reaction ?

(A) Hydrolysis of Ethyl chloride by NaOH.
(B) Purification of Acetaldehyde by $NaHSO_3$.
(C) Alkylation of Anisol.
(D) Decarboxilation of Acetic acid.

72. Compare boiling point of isomeric alkyl amines.

(A) $1° > 2° > 3°$
(B) $1° > 2° < 3°$
(C) $1° < 2° < 3°$
(D) $1° < 2° > 3°$

73. The number of Sigma (σ) and Pi (π) covalent bonds respectively in Benzene nitrile are .....

(A) 5, 13
(B) 15, 3
(C) 13, 5
(D) 16, 2

(Space for Rough Work)

74. Which type of polymer is Bakelite ?

(A) Addition polymer (B) Homo polymer

(C) Condensation polymer (D) Bio polymer

75. Natural rubber is not used in making footwear for polar regions because .....

(A) Natural rubber becomes soft at temperature lower than 10°C.

(B) Natural rubber becomes brittle at temperature lower than 10°C.

(C) Natural rubber melts at temperature lower than 10°C.

(D) Natural rubber becomes stronger at temperature lower than 10°C.

76. How Glucose is related with Fructose ?

(A) Functional group isomerism (B) Rotamers

(C) Position isomerism (D) Geometrical isomerism

77. How can you say that Glucose is cyclic compound ?

(A) Glucose undergoes Tollen's reaction.

(B) Glucose reacts with Phenyl hydrazine.

(C) Glucose fails to react with Sodium hydrogen sulphite.

(D) Glucose reacts with Nitric acid.

(Space for Rough Work)

78. Progesterone is secreted by .....

(A) Thyroid (B) Ovaries

(C) Adrenal (D) Testes

79. Which of the following is Pheromone ?

(A) Linalool (B) Disparlure

(C) BHA (D) Alitame

80. Match metal ion (Part-1) with colour (Part-2) in presence of Alizarin.

Part-I	*Part-II*
I - Sr^{+2}	*a* - Blue
II - Mg^{+2}	*b* - Pink
III - Al^{+3}	*c* - Violet
IV - Ba^{+2}	*d* - Red

(A) I - *a*, II - *d*, III - *c*, IV - *b*

(B) I - *b*, II - *a*, III - *d*, IV - *c*

(C) I - *c*, II - *b*, III - *a*, IV - *d*

(D) I - *d*, II - *c*, III - *b*, IV - *a*

(Space for Rough Work)

(Space for Rough Work)