AMINES

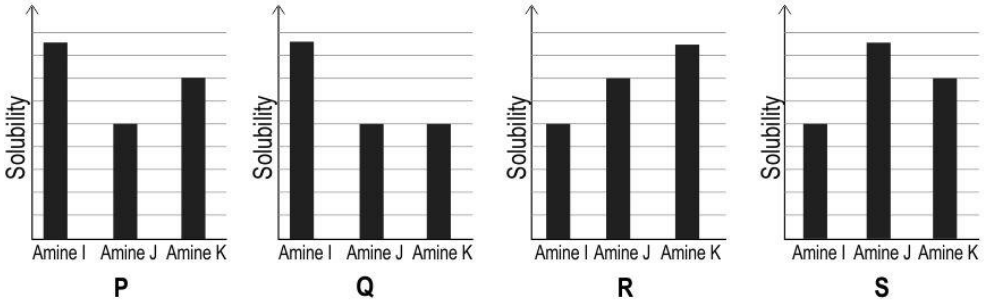
Q.No	Question	Marks
	Multiple Choice Question	
Q.163	The reaction of an arene diazonium chloride with aniline in an acidic medium gives a coloured compound. Which of the following occurs during the reaction? A. Benzene ring is replaced. B. Nitrogen is displaced. C. Diazo group is retained. D. Amino group is displaced.	1
Q.164	Which of the following is TRUE about the solubility of Ethylamine and Aniline? A. Aniline is soluble in HCl. B. Both are insoluble in HCl. C. Both are soluble in water. D. Ethylamine is insoluble in water.	1
Q.165	During an activity session, the teacher kept some pieces of papers in a box in which the names of chemicals were written. The teacher then asked 4 groups of students to select the appropriate pieces of paper with names of chemicals used to prepare para nitro aniline. The 4 groups have selected pieces of paper as follows; Group-1 Conc. H_2SO_4, Conc.HNO_3 , Acetic anhydride, Aniline. Group-2 Aniline, Conc.H_2SO_4 and Con. HNO_3 . Group-3 Conc.HNO_3 with Pyridine, Aniline Group-4 Conc. HNO_3, Conc. H_2SO_4, Aniline, Acetyl Chloride. Which group or groups of students have selected it appropriately. A. Group1 and 4 B. Group 3 and 4 C. Group3 D. Group 1	1

Q.166	The same volume of three isomeric amines are boiled and the time taken for vapourisation of the entire volume is noted in the table given below: **Amine** | **Time taken to vapourise(in secs)** Amine F | 30 Amine G | 49 Amine H | 100 Which of the following statements is most likely to be TRUE about these three amines? A. The expected molar mass of amine G and H are different B. Amine F is most likely to be a primary amine C. Amine G is most likely to be a secondary amine D. The expected molar mass of amine F is greater than that of amine H	1
Q.167	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Assertion (A): Aniline cannot be prepared by the Gabriel phthalimide synthesis. Reason (R): Aryl halides do not undergo nucleophilic substitution. Which of the following is correct? A. Both A and R are true, and R is a correct explanation of A. B. Both A and R are true, and R is not the correct explanation of A. C. A is true, but R is false. D. A is false, but R is true.	1
Q.168	Aniline on heating with chloroform and alcoholic KOH gives a foul-smelling product. Making which of the following changes in the reaction would still produce a foul-smelling product? P) replacing aniline with ethylamine Q) replacing chloroform with carbon tetrachloride R) replacing alcoholic KOH with alcoholic NaOH A. only P B. only R C. only Q and R D. only P and R	1

Q.169	Benzylamine is formed when _____ is treated with sodium amalgam in the presence of ethanol. A. benzonitrile B. aniline C. nitrobenzene D. benzylcyanide	1
Q.170	Which of the options correctly identifies the amount of ammonia and alkyl halide used in the reaction and the type of amine obtained?	1

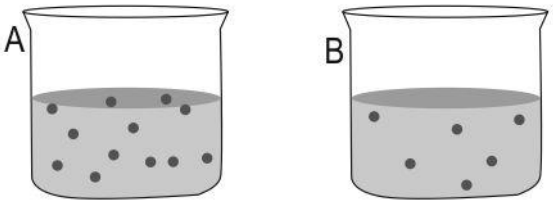
	Amount of ammonia used	Amine formed
L	Equimolar ratio of ammonia and alkyl halide	Secondary amine is the minor and tertiary amine is the major product
M	Large excess of ammonia	Quaternary ammonium salt as the only product
N	Large excess of ammonia	Primary amine as the major product
O	Equimolar ratio of ammonia and alkyl halide	Combination of all three types of amines in equimolar concentration

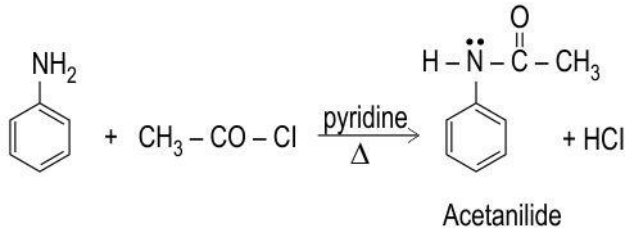
A. L
B. M
C. N
D. O

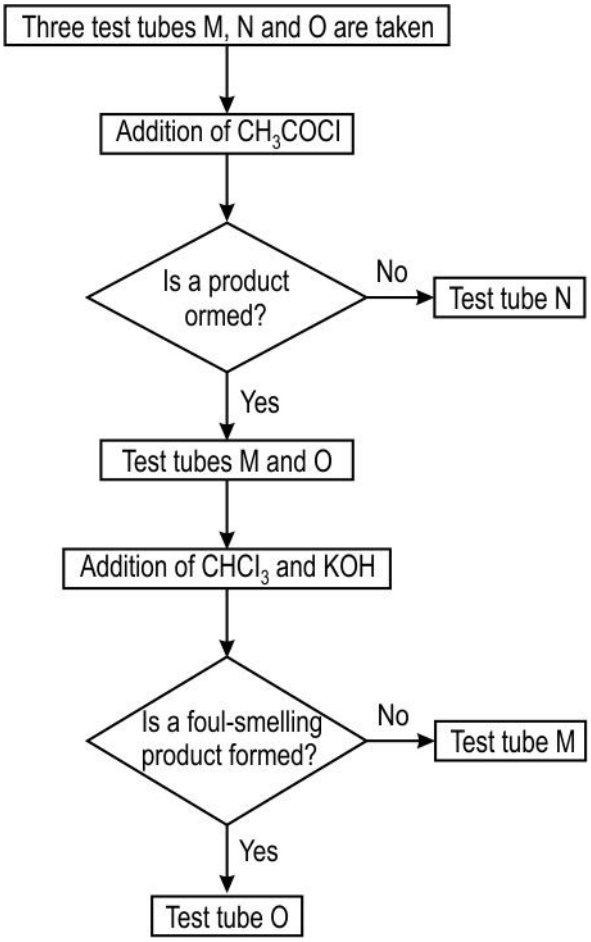
Q.171	The graphs below show the solubility of a primary, a secondary and a tertiary aliphatic amine I, J, and K in water, at the same temperature. The number of carbon atoms in each of the compounds is three. Amine I is the tertiary amine, amine J is the primary amine, and amine K is the secondary amine.  Which of the graphs identifies the three amines correctly? A. P B. Q C. R	1

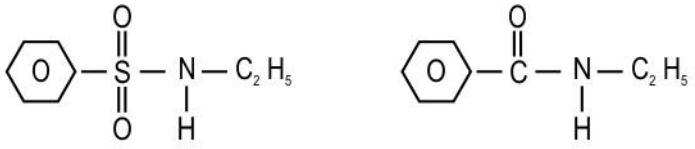
	D. S	
Q.172	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). **Assertion (A)**: Besides ortho and para nitroaniline, nitration of aniline in an acidic medium also gives the meta derivative. **Reason (R):** In acidic medium aniline gets protonated forming anilinium ion. Which of the following is correct? A. Both (A) and (R) are correct and (R) is the correct explanation of (A) B. Both (A) and (R) are correct and (R) is not the correct explanation of (A) C. (A) is true but (R) is false D. (A) is false but (R) is true	1
Q.173	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). **Assertion (A):** Cyanobenzene cannot be prepared from chlorobenzene by nucleophilic substitution. **Reason (R):** The cyano group can directly be introduced in a benzene ring by substitution. Which of the following is correct? A. Both (A) and (R) are correct and (R) is the correct explanation of (A) B. Both (A) and (R) are correct and (R) is not the correct explanation of (A) C. (A) is true but (R) is false D. (A) is false but (R) is true	1
Q.174	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). **Assertion (A):** Propyl amine on reaction with nitrous acid forms aliphatic diazonium salts. **Reason (R):** Aliphatic diazonium salts are stable at 273-278 K. Which of the following is correct? A. Both (A) and (R) are correct and (R) is the correct explanation of (A) B. Both (A) and (R) are correct and (R) is not the correct explanation of (A) C. (A) is true but (R) is false D. (A) is false but (R) is true	1

Q.175	Which of the following sets have all the compounds with a pKb value more than ammonia? A. N, N-dimethylaniline, methylamine, ethanamine. B. aniline, N, N-dimethylaniline, N-methylaniline C. N,N-Dimethylmethanamine, Ethanamine, N, N-Diethylethanamine D. N-Diethylethanamine, ethanamine, Methanamine	1
Q.176	Two isomers, n- $C_4H_9NH_2$ and $(C_2H_5)_2NH$ have molar mass of 73 each. Which of the following is correct about their boiling points? A. The boiling point of n- $C_4H_9NH_2$ is higher than that of $(C_2H_5)_2NH$. B. The boiling point of $(C_2H_5)_2NH$ is higher than that of n- $C_4H_9NH_2$. C. Both the amines will have the same boiling point. D. The boiling point of both the amines will be lower than that of water.	1
Q.177	Aryl diazonium salts undergo reductive removal of the diazonium group in presence of weak acids. Which of the following products will be formed during this process? A. Chlorobenzene B. Phenol C. Benzene cyanide D. Benzene	1
Q.178	Benzene sulphonyl chloride is a chemical which can be used to identify the class of an Amine. When an amine 'A' reacts with benzene sulphonyl chloride it gives precipitate of sulphonamides which is soluble in alkali. The amine A is; A. N-Ethylethanamine B. N,N-Diethylethanamine C. Ethanamine D. N-Methylbenzenamine	1
Q.179	2-Methyl butanamide on reacting with Br_2 in alkaline medium gives an amine. Which of the following is a correct characteristic of that amine? A. It is optically active. B. It is a secondary amine. C. It can form a stable diazonium salt. D. It has one carbon atom more than the amide.	1
Free Response Questions/Subjective Questions		
Q.180	Consider two unknown primary amine compounds A and B, one of which is aromatic and the other is aliphatic amine. Compound A reacts with $NaNO_2$ in	4

	HCl to give a useful diazonium compound. But amine B on reaction with $NaNO_2$ and HCl produces ethanol. (a) Which of the two amines is aromatic and why? (b) Give evidence to identify the amine B.	
Q.181	You are given three compounds of nitrogen having the general formula NH_2-X. If X= C_6H_6, CH_3 or H, which of the three compounds will be protonated MOST easily in water? Justify your answer.	2
Q.182	Which out of H-NH_2 and CH_3-NH_2 has higher pKb value? Illustrate the ionisation of these compounds in aqueous medium and write their K_b expression to justify your answer.	3
Q.183	Two beakers 'A' and 'B' contain aqueous solutions of methyl amine. It is observed that beaker A contains more OH^- than beaker 'B'  Prove which of the two solutions will have higher pK_b value and why?	4
Q.184	There are 5 reagent bottles containing $NaNO_2$, HCl, Phenol, Aniline and NaOH separately in them. The teacher asked Amit to make an orange dye using suitable chemicals out of the five reagents given. (a)Write the chemical equations and the conditions for the steps involved in the preparation of the orange dye. (b) Name the type of reaction of the step in which phenol reacts.	3
Q.185	(a) Why are quarternary ammonium salts used in detergents? Explain it by giving one example. (b) Write the chemical reaction involved in the Ammonolysis process of preparation of quarternary ammonium salt.	3
Q.186	During an activity period, the teacher asked the students to write the chemical reactions involved in the conversion of compound Cl-$(CH_2)_4$-Cl into hexane-1,6 diamine. She also suggested students to use chemicals such as reducing agents, alcohol, cyano compounds etc as per the requirements. She then asked them to report their findings by answering the following: i) Write the chemical reaction taking place in first step of the conversion. ii) Identify the type of reaction. Justify. iii) Show the chemical reaction for the formation of the final product.	3

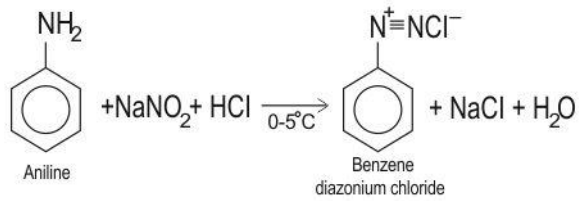
Q.187	p-chlorobenzene diazonium chloride and p-methyl benzenediazonium chloride are taken in separate beakers. Now phenol and a few drops of NaOH is added to both the beakers. Which of the two para-substituted diazonium compounds will couple preferentially with phenol to give a coloured dye? Explain why.	2
Q.188	Primary and secondary amines undergo acylation reaction in the presence of a stronger base than the amine.  Acetanilide (a) What would happen if a stronger base is not used for the acylation reaction? (b) Can we use anhydrous $AlCl_3$ in place of a strong base? Justify your answer by writing the reaction.	3
Q.189	(a) When benzene diazonium chloride is treated with fluoroboric acid it gives a compound 'X'. Identify compound X. (b) When compound '*X*' is heated alone or with $NaNO_2$ in the presence of Cu it releases N_2 gas. What are the other two products produced when compound '*X*' is: i) heated alone? ii) heated with $NaNO_2$? Write the chemical equations involved in each of the reactions.	5
Q.190	Anusrita was measuring the pK_b of of two compounds A and B. She recorded her observations in the following table: <table><tr><th>A</th><th>B</th></tr><tr><td>$pK_b = 4.70$</td><td>$pK_b = 9.38$</td></tr></table> Which test tube is expected to contain benzylamine and which is expected to contain aniline? Give a reason for your choice.	3
Q.191	One of the ways of producing ethylamine from chloroethane is by adding ammonia to it. It is a nucleophilic reaction. (a) What reaction mechanism does this reaction follow? (b) Why is this not a very common method to prepare amines?	4

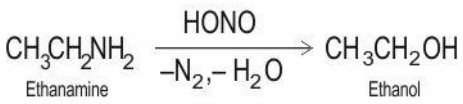
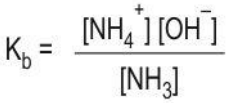
	(c) Between tertiary and quaternary amines, which will have a greater bond angle ? Justify your answer.	
Q.192	(a) Arrange the following in the increasing order of pK_b. Aniline, 2-methylaniline, 3-methylaniline, 4-methylaniline. (b) Give a reason for your arrangement.	3
Q.193	(a) Identify the type of amines M,N, and O in the flowchart below:  (b) Give one example of each type of amine.	3
Q.194	For a school project work Mrs. Roy asked her students to dye a white hanky. Ritama and Baivavi took the help of their chemistry teacher for the project. Ritama dyed her white hanky yellow in colour, and Baibavi dyed it orange. The yellow colour was formed by preparing a compound X and immediately adding aniline to it. The orange colour was formed by preparing compound X and immediately adding phenol to it. The students saw compound X was readily soluble in cold water.	5

	(a) Can an aqueous solution of compound X conduct electricity? Give a reason for your answer. (b) Write the equation showing the formation of compound X. (c) Why is aniline or phenol added immediately to compound X as soon as it is prepared? (id Write balanced equations showing the formation of the yellow and orange dyes.	
Q.195	Of the two compounds P and Q given below, which one is more likely to be acidic in nature? Justify your answer.  (P) (Q)	2
Q.196	While studying about diazotisation of amines and their reactions, students carried out the following two processes P and Q in the laboratory to prepare orange-coloured dye. P) aniline + dilute HCl + $NaNO_2$ + ice $\xrightarrow{30\ minutes}$ X $\xrightarrow{+\ phenol}$ Q) aniline + dilute HCl + $NaNO_2$ $\xrightarrow{30\ minutes}$ X $\xrightarrow{+\ phenol}$ Which of the two processes is likely to produce the orange-coloured dye in higher yield? Justify your answer.	2
Q.197	Krishna took three amines U, V, and W. The three amines were added to Hinsberg's reagent. The products were added to aq. NaOH and the observations were tabulated as follows: **Amines** | **Observations after the addition of the products formed to aq.NaOH solutions** U | The product is soluble in aq.NaOH. V | The product is insoluble in aq.NaOH W | The product is insoluble in aq.NaOH (a) What is Hinsberg's reagent? Name another reagent that can replace this one. (b) Which of the amine(s) have the structural formula of R-NH-R? (c) What does the solubility of the products formed in aq. alkali imply? (d) Which of the following amines may be prepared by the Gabriel phthalimide process? Give a reason.	5

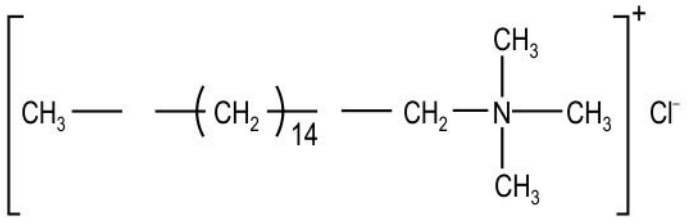
Q.198	Propanamide reacts with bromine in an aqueous solution of sodium hydroxide to form a compound G. a) What is the geometry of compound G and the hybridisation of the N-atom in compound G? b) What is the IUPAC name of the compound G?	2
Q.199	An amine M reacts with sulphuric acid at 473 K to form compound N. Amine M cannot be prepared by the Gabriel phthalimide synthesis. It is the simplest amine of its type. a) Identify M and write its IUPAC name. b) If electricity is passed through an aqueous solution of compound N and a bulb is connected to this circuit what will be your observation and why?	3
Q.200	Prapti takes some aniline in a container. She adds to it, a mixture of sodium nitrite and hydrochloric acid at 40°C. She leaves the mixture beside an open window on a hot and sunny day. What will be the change in the composition of the reaction mixture? Why?	2
Q.201	Aradhya prepares chlorobenzene from benzene diazonium chloride by two methods. With the same input of the reactant the output in method I is 25cc of chlorobenzene and in method II 30cc of chlorobenzene is produced. a) State the reactants used in method I and II. b) What is the reason for the observation?	2
Q.202	Which of these $(R)_4N^+Cl^-$ or $(R)_3N$ is more basic? Give reason.	2

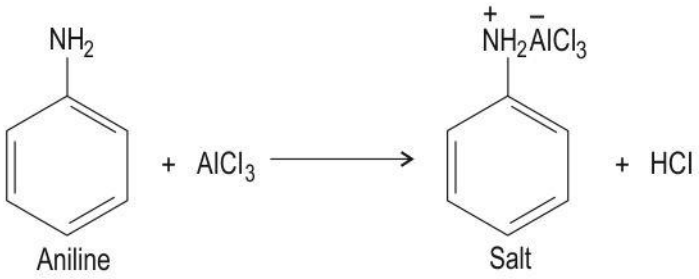
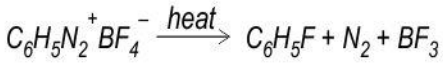
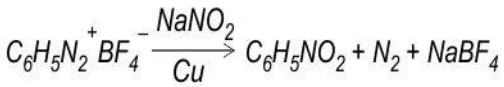
Answer Key and Marking Scheme

Q.No	Answers	Marks
Q.163	C. Diazo group is retained.	1
Q.164	A. Aniline is soluble in HCl.	1
Q.165	A. Group1 and 4	1
Q.166	C. Amine G is most likely to be a secondary amine	1
Q.167	C. A is true, but R is false.	1
Q.168	D. only P and R	1
Q.169	A. benzonitrile	1
Q.170	C. N	1
Q.171	D. S	1
Q.172	A. Both (A) and (R) are correct and (R) is the correct explanation of (A)	1
Q.173	C. (A) is true but (R) is false	1
Q.174	C. (A) is true but (R) is false	1
Q.175	B. aniline, N, N-dimethylaniline, N-methylaniline	1
Q.176	A. The boiling point of n- $C_4H_9NH_2$ is higher than that of $(C_2H_5)_2NH$.	1
Q.177	D. Benzene	1
Q.178	C. Ethanamine	1
Q.179	A. It is optically active.	1
Q.180	(a)Compound A is an aromatic compound as it reacts with $NaNO_2$ and HCl to give Diazonium salt.  	4

	(b) Aliphatic amines give unstable diazonium compound on diazotization i.e. on reaction with $NaNO_2$ and HCl. The unstable Diazonium compound decomposes to give corresponding alcohol (with the release of $N_{2(g)}$.) Since alcohol is ethanol so the amine is Ethanamine ($C_2H_5NH_2$)  	
Q.181	- In C_6H_5-NH_2, the unshared pair of electrons on nitrogen is conjugated with the benzene ring making it less available for protonation than in ammonia. [1] The CH_3 group is an electron releasing group. This makes the unshared pair of electrons on N more available and a stronger proton acceptor than ammonia. [1]  Hence CH_3NH_2 gets protonated most easily. (The equation is only for reference.)	2
Q.182	The two Amines are H-NH_2 and CH_3-NH_2. pK_b value of H-NH_2 is higher. We know - $pK_b = -\log K_b$ H-NH_2 will ionise as follows; H-NH_2 + H_2O ——> NH_4^+ + OH^-  Since the lone pair of electrons on N in Ammonia accepts proton slowly in aqueous medium hence less OH^- ion will be available so less K_b therefore more pK_b In the same way Methanamine ionises CH_3-NH_2 + H_2O ———>$CH_3NH_3^+$+ OH^-	3

	$K_b = \frac{[OH^-][CH_3NH_3^+]}{[CH_3NH_2]}$ The methyl group is an electron releasing group. So the higher electron density on nitrogen makes it a stronger proton acceptor. Thus it furnishes more OH^- ion and shows comparatively higher K_b. Therefore its pK_b value is less.	
Q.183	Presence of more OH^- ions shows solution 'A' is more basic. we know that higher the concentration of OH^- higher is the K_b i.e.dissociation constant. [1] The reaction can be represented as; $CH_3\text{-}NH_2 + H_2O \longrightarrow CH_3NH_3^+ + OH^-$ [1 mark] $K_c = \frac{[CH_3NH_3^+][OH^-]}{[CH_3NH_2]}$ (Here $K_c = K_b$ i.e dissociation constant of base in aqueous solution.) But pK_b and K_b are related as $pK_b = -\log K_b$ [1] Thus we can say pK_b value of solution 'B' is higher because it has less concentration of OH^-. [1]	4
Q.184	(a) (i) 0.5 marks each for writing the formula of aniline and benzenediazonium chloride and 0.5 marks for mentioning the temperature: $C_6H_5NH_2 + NaNO_2 + HCl \xrightarrow{0\ ^\circ C} C_6H_5N_2^+Cl^-$ aniline benzenediazonium chloride (ii)0.5 marks each for writing the formula of phenol and p-hdroxyazobenzene $C_6H_5N_2^+Cl^- + C_6H_5OH + NaOH \longrightarrow C_6H_5 - N = N - C_6H_5OH$ benzenediazonium chloride phenol p - hydroxyazobenzene (b) electrophilic substitution	3
Q.185	Quarternary ammonium salts, which have one of the R= long hydrocarbon chain, are used in detergents because they can serve as surfactants.	3

	The molecules of these salts have a polar and a non-polar end. The non-polar end is soluble in oil(dirt) and the polar end is soluble in water. Thus it helps in the cleaning process.  n-hexadecyltrimethyl ammonium chloride or (cetyltrimethyl ammonium chloride) ex . (1 mark each for the explanation and the example) Preparation : $R\text{-}X + NH_3 \longrightarrow RNH_2$ (A) Compound A is Alkanamine.(RNH_2) $RNH_2 + 3R\text{-}X \longrightarrow R_4N^+X$ (detergent) (1)	
Q.186	Conversion given is; $Cl\text{-}(CH_2)_4\text{-}Cl \longrightarrow H_2N\text{-}CH_2(CH_2)_4\text{-}CH_2NH_2$ i) At first chloro compound will be converted into cyano compound.So first step is- $Cl\text{-}(CH_2)\text{-}Cl + KCN_{(alc.)} \longrightarrow NC\text{-}(CH_2)_4\text{-}CN$ (1) ii) This reaction is called Nucleophilic substitution reaction because nucleophile CN^- replaces Cl ion. (1) iii) Final product hexane-1,6-diamine is obtained by reduction of dicyano compound obtained in first step using reducing agent Ni or Pt or $LiAlH_4$ $NC\text{-}(CH_2)\text{-}CN + H_{2(g)} \xrightarrow{Pt}$ $H_2N\text{-}CH_2\text{-}(CH_2)_4\text{-}CH_2\text{-}NH_2$ (1)	3
Q.187	- The formation of the coloured dye is an Electrophilic substitution reaction in which, the diazonium compound is the electrophile and phenol is the substrate. [1] Since the chloro group is an electron withdrawing group, it increases the positivity on N_2^+ ion hence *p*-chlorobenzene diazonium cation is a stronger	2

	electrophile than the *p*-methyl benzenediazonium cation as the methyl group is an electron releasing group. So, *p*- chlorobenzene diazonium chloride couples preferentially with phenol to form a coloured dye. [1]	
Q.188	(a) - In the reaction, the corresponding amide is formed with the release of acid HCl. This acid is neutralised by the stronger base present in the reaction thus equilibrium will shift in forward direction [1] - If a stronger base is not used then the HCl formed in the reaction will be neutralised by aniline itself and this will make the reaction to stop after a point. [1] (b) No, we cannot use anhydrous $AlCl_3$ in place of a base because $AlCl_3$ is a Lewis acid and amines are Lewis bases. They both will react to give the corresponding salt and not amide.  	3
Q.189	(a) Compound X is benzenediazonium fluoro (b) (i) When compound *X* is heated alone it gives fluorobenzene and boron trifluoride with the release of N_2 gas.  [Give 0.5 marks each for mentioning the two products and 1 mark for the correct equation] ii) When compound *X* is heated with $NaNO_2$ in presence of Cu metal it gives Nitrobenzene and sodium fluoroborate with the release of N_2 gas. (b) (ii)  [Give 0.5 marks each for mentioning the two products and 1 mark for the correct equation]	5

Q.190	-Test tube A contains benzylamine. [1] -The lone pair of electrons on N-atom of aniline is conjugated with and is delocalised over the benzene ring and hence is less available for protonation. [1 mark] - in aralkylamines, the lone pair of electrons on the N-atom is not conjugated with the benzene ring and therefore is not delocalized. Hence, the lone pair of electrons on the N-atom in aralkylamines is more readily available for protonation than that on the N-atom of aniline. [1] (No marks to be awarded if a reason is not given.)	3
Q.191	(a) The reaction mechanism followed is S_N2. [1] (b) Ammonolysis has the disadvantage of yielding a mixture of primary, secondary and tertiary amines and also a quaternary ammonium salt. [1] (c) Quaternary amines have greater bond angle than tertiary amines. Quaternary amines are sp^3 hybridized, have a tetrahedral shape, and have a bond angle of 109.5^o. Due to the presence of unshared pair of electrons, the bond angle is less than 109.5° in the case of triethylamine. [*1 mark for the correct bond angle and 1 mark for the reason.*]	4
Q.192	(a) 4-methylaniline < 3-methylaninline < aniline < 2-methylaniline. [1] (b) The methyl group is an electron-releasing group. Its effect is more at the p-position than at the meta position. So, 4-methylaniline is more basic than 3-methylaniline. The basic nature of 2-methyl aniline is expected to be more than aniline because of the +I-effect of the -CH3 group. But it is less than aniline due to the steric effect of the $-CH_3$ and the $-NH_2$ group in close proximity. The basic nature of 3-methyl aniline will be more than aniline because of the +I-effect of the $-CH_3$ group. The more basic the nature, the lower the pK_b value. [2 marks for correct reason]	3
Q.193	(i) Test tube M = Secondary amine Test tube N= Tertiary amine Test tube O = Primary amine [0.5 marks for each correct answers] (ii) Any correct example for each type of amine. [0.5 marks for each correct answers]	3

Q.194	(a) Aq. solution of compound X can conduct electricity due to the presence of ions in it. [1] (b) $C_6H_5NH_2 + NaNO_2 + 2HCl$ -------> $C_6H_5N_2^+Cl^-$ (compound X)+ $NaCl + 2H_2O$ [1] (c) Due to its instability, the benzene diazonium chloride salt is not generally stored and is used immediately after its preparation. [1] (d) $C_6H_5N_2^+Cl^- + C_6H_5NH_2$ -------> $C_6H_5N{=}NC_6H_5{-}NH_2$ (yellow dye)+ $Cl^- + H_2O$ [1] $C_6H_5N_2^+Cl^- + C_6H_5OH$ -----> $C_6H_5N{=}NC_6H_5{-}OH$ (orange dye)+ $Cl^- + H_2O$ [1]	5
Q.195	The sulphonyl group is a stronger electron-withdrawing group compared to the carbonyl group which makes the H atom attached to the N atom more acidic in nature. Hence P is more likely to be acidic in nature than Q.	2
Q.196	The orange-coloured dye will be produced in larger amounts by process P. [1] The diazonium salt X is unstable at higher temperatures and hence should should be prepared at low temperature or used immediately. [1]	2
Q.197	(a) Benzene sulphonyl chloride ($C_6H_5SO_2Cl$), which is also known as Hinsberg's reagent. Benzene sulphonyl chloride is replaced by p-toluene sulphonyl chloride. *[0.5+0.5]* (b) Amine V and W have the structural formula of R-NH-R. *[0.5+0.5]* (c) The hydrogen attached to nitrogen in the product formed after the amine U reacts with Heisenberg's reagent is strongly acidic due to the presence of a strong electron-withdrawing sulphonyl group. Hence, it is soluble in aq.NaOH. Amine V and W do not contain any hydrogen atom attached to the nitrogen atom in the product formed are not acidic and hence insoluble in aq.NaOH. Amine U may be prepared by the Gabriel phthalimide process. *[2]* (d) Amine U is soluble in aq. NaOH. So, it is a primary amine. Gabriel synthesis is used for the preparation of primary amines. *[0.5+0.5]*	5
Q.198	a) 0.5 marks each for the following:	2

<table>
<tr><td></td><td>- The geometry is pyramidal.

- the hybridisation of the N-atom in compound G is sp^3 .

b) The IUPAC name of compound G is Ethanamine.</td><td></td></tr>
<tr><td>Q.199</td><td>a) Amine M is aniline and its IUPAC name is phenylamine. [0.5+0.5]

b) If electricity is passed through an aqueous solution of compound N and a bulb is connected to this circuit then the bulb will not glow. This is because compound N forms a zwitter ion in the reaction medium. Zwitter ions do not conduct electricity as it is a neutral ion with both positive and negative charges in the same molecule. [1+1]</td><td>3</td></tr>
<tr><td>Q.200</td><td>When a mixture of sodium nitrite with hydrochloric acid at 40°C is added to aniline, benzene diazonium chloride is formed. This compound decomposes at high temperatures. [1]

Since Prapti leaves this reaction mixture beside an open window on a hot and sunny day the temperature will be above 10°C and the diazonium compound decomposes to phenol. [1]</td><td>2</td></tr>
<tr><td>Q.201</td><td>a) The reactants are:

<table><tr><th></th><th>Method I</th><th>Method II</th></tr><tr><td>Reactant</td><td>benzene diazonium chloride + Cu in HCl.</td><td>benzene diazonium chloride+ cuprous chloride in HCl</td></tr></table>
[0.5+0.5]

b) The copper in method II is in +1 state with complete $3d^{10}$ electronic configuration. This favours the forward reaction and hence the yield is more. [1]</td><td>2</td></tr>
<tr><td>Q.202</td><td>$(R)_3N$ is more basic as in this N has a lone pair of electron which it can donate.Thus it can acts as Lewis base. [1mark]

On the other hand in $(R)_4N^+Cl^-$ the lone pair of N is already protonated. Hence it is less basic. [1]</td><td>2</td></tr>
</table>