FEDERAL PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT, 2012

Roll Number

CHEMISTRY, PAPER-I

TIME ALLOWED:	**(PART-I MCQs)**	**30 MINUTES**	**MAXIMUM MARKS: 20**
THREE HOURS	**(PART-II)**	**2 HOURS & 30 MINUTES**	**MAXIMUM MARKS: 80**

NOTE: **(i)** Candidate must write **Q.No.** in the **Answer Book** in accordance with **Q.No.** in the **Q.Paper**.
(ii) Attempt **ONLY FOUR** questions from **PART-II**. All questions carry **EQUAL** marks.
(iii) Use of simple calculator is allowed.
(iv) Periodic Table is on page-2.
(v) Extra attempt of any question or any part of the attempted question will not be considered.

PART-II

Q.2. (i). Glucose is formed according to the following reaction, absorbing 2840 kJ of heat. How much energy will be given out by combustion of 1.08g of glucose? **(04)**

$6CO_{2(g)} + 6H_2O_{(l)} \rightarrow C_6H_{12}O_{6(s)} + 6O_{2(g)}$

(ii). State and explain the relationship of ionization energy of an atom with its reactivity. **(08)**
(iii). Explain:Why dipole movement of BF_3 is Zero? **(02)**
(iv) Why dipole movement of NH_3 is greater than that NF_3 ? **(02)**
(v) Why does SO_2 have dipole movement while CO_2 does not? **(04)**

Q.3. (i) Differentiate between a gangue and slag. Give an example of a metallurgical step where stag, flux and gangue are involved simultaneously. **(06)**
(ii) Describe the different industrial process for preventing the metals from corrosion. **(08)**
(iii) Draw diagram extraction of aluminum from soil. **(04)**
(iv) Name the flux used in the extraction of Iron. **(02)**

Q.4. (i) Given the reaction: $XeF_{4(g)} + F_{(g)}\ XeF_{6(g)}$ **(04)**
Predict the change in hybridization and consequent, final shape of the molecule followed in the above reaction.
(ii) Valence shell electron pair repulsion theory can be used to predict the shapes of molecules. Using this theory explain the shapes acquired by BF_3 and CH_4. **(08)**
(iii) Explain why HOH bond angle in H_2O is slightly less than the tetrahedral angle 109.5. **(08)**

Q.5. (i) A galvanic cell consists of metallic Zn plate immersed in 0.1 M Zn $(NO_3)_2$ solution and metallic plate of lead in 0.02 M Pb $(NO_3)_2$ solution. Given **(3,3,6,6,2)**
$E^0Zn_2+ Zn = -0.76$ V, $E^0Pb_2+ Pb = -0.13$ V
Write the half-cell reactions.
(ii) Write the overall reaction of the cell. (iii) Calculate the e.m.f. of the cell.
(iv) Explain the Nernst heat theorem. (v) Define enthalpy of formation.

Q.6. Write one reaction each for the preparation of the following. Also write one use of each product. **(3,3,3,3,6,2)**
(i) Bleaching powder (ii) Caustic Soda (iii) Quick lime (iv) Ammonia
(v) How is caustic soda manufactured by Using Nelson's cell?
(vi) What is an ideal solution?

Q.7. (i) What do you understand by entropy? In what way the total entropy change is related to spontaneity of a system and to a system in equilibrium. **(04)**
(ii) Entropy change from liquid water to steam at 373 K is 109J mol^{-1} K^{-1}. What is the enthalpy change for the transition of liquid water to steam at 373 K. **(04)**
(iii) Define Gibbs free energy function. Explain its significance. **(04)**
(iv) Explain following: **(08)**
(a) Ion selective electrode (b) Quantum yield
(c) Fuel Cell (d) Langmuir isotherm

CHEMISTRY, PAPER-I

Q.8.	(i)	Why is chlorination not the most desirable method of disinfecting polluted water?	**(03)**
	(ii)	What are anthropogenic pollutants? Give two examples each of primary and secondary pollutants.	**(04)**
	(iii)	What are the effects of detergents on fresh water bodies?	**(03)**
	(iv)	Calculate the pH of 0.001M HCl solution.	**(02)**
	(v)	How global Warming is caused? List and explain four consequences of green house effect.	**(08)**

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COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT, 2012

Roll Number

CHEMISTRY,PAPER-II

TIME ALLOWED:	**(PART-I MCQs)**	**30 MINUTES**	**MAXIMUM MARKS: 20**
THREE HOURS	**(PART-II)**	**2 HOURS & 30 MINUTES**	**MAXIMUM MARKS: 80**

NOTE: **(i)** Candidate must write **Q.No.** in the **Answer Book** in accordance with **Q.No.** in the **Q.Paper**.
(ii) Attempt **ONLY FOUR** questions from **PART-II**. All questions carry **EQUAL** marks.
(iii) Use of simple calculator is allowed.
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PART-II

Q.2. **(a)** What is the difference between Valance Bond Theory and Molecular Orbital Theory? **(08)**

(b) Draw the molecular orbital diagram of CO molecule showing sigma p*i* bonding, nonbonding and anti bonding molecular orbitals. **(08)**

(c) Discuss the difference between the hybridization of SO_2 and SO_3 **(04)**

Q.3. **(a)** Discuss the rate law of SN_1 mechanism. **(06)**

(b) What is the importance of half life in the determination of order of reactions? **(06)**

(c) What is pseudo first order reaction? & What is its importance? **(08)**

Q.4. **(a)** Describe the differences between physical adsorption and chemiadsorplion. **(08)**

(b) The data of Langmuir for the adsorption of Nitrogen on mica at 90^0 K given **(08)**

P(atm)	2.8	3.4	4.0	4.9	6.0	7.3	9.4	12.8	17.9	23.5
Amt adsorbed cumm at 20^0 C & 760mm	12.0	13.4	15.1	17.9	19.0	21.6	23.9	25.5	28.2	30.8

Estimate the surface area of the mica sample in the Langmuir experiment?

(c) Define Homogenous catalyst & Hetrogenous catalyst. **(04)**

Q.5. **(a)** Discuss stereoisomerism in compounds having 2 similar asymmetric carbon atoms. **(06)**

(b) Draw Fisher projection formulae for the following compounds. **(08)**

i. R & S 2-Bromopentane ii. R & S 3-chloro-1-pentane
iii. R & S 3-chloro-3Methyloctane iv. R & S 2-pentanol

(c) What do you understand by the terms Z & E isomers? Illustrate your answer with example. **(06)**

Q.6. **(a)** Discuss the structure of Grignard reagent. **(04)**

(b) How these compounds can be prepared by Grignard reagent? **(12)**
(i) Ethane (ii) Acetic acid (iii) 2-Butanol

(c) What is diazotisation reaction? **(04)**

Q.7. How would you prepare the following compounds from benzene? Name each reaction as well. **(20)**

(i) Acetopnenon **(ii)** Bromobenzene **(iii)** Maleic anhydride
(iv) Toluene **(v)** Bengaldehyde

Q.8. **(a)** Write main steps in the formation of following polymers: **(3+3)**

i. Nylon 6,6 and polyester by condensation polymerization.
ii. Polyethlene by Free Radical Polymerization.

(b) Differentiate between oil, fat & wax with examples. **(09)**

(c) What are alkaloids? **(05)**

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