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Sc-103/Chem-I(N)/1st Sem/2018/M

## CHEMISTRY – I

(New Course)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

### PART – A

1. Fill in the blanks :

1×5=5

- (i) 90 grams of water contains \_\_\_\_\_ number of molecules.
- (ii) Conjugate base of  $\text{H}_2\text{SO}_4$  is \_\_\_\_\_.
- (iii) An atomic orbital can contain maximum of \_\_\_\_\_ electrons.
- (iv) Atomic radius \_\_\_\_\_ along a period from left to right.
- (v) Presence of bicarbonate salt makes water \_\_\_\_\_ hard.

[Turn over

2. Write true or false of the following :  $1 \times 5 = 5$

- (i) Rain water is sterilized water.
- (ii) Quantum theory is used in Bohr's model of atom.
- (iii) Chemical equivalent = e.c.ex Faraday.
- (iv) Magnetic quantum number indicates shape of the atomic orbitals.
- (v) Nitric acid is an oxidizing agent.

3. Give your answer in one word/one sentence each :

$1 \times 5 = 5$

- (i) State Graham's law of diffusion.
- (ii) Give one example of a neutral salt.
- (iii) What is electro-chemical equivalent ?
- (iv) State Hund's rule of maximum multiplicity.
- (v) How is  $K_p$  related to  $K_c$  ?



4. Choose the correct answer : 1×5=5

(i) At STP, 32 gram of methane occupies

- (a) 22.4 litre                      (b) 44.8 litre  
(c) 11.2 litre                      (d) 2 litre

(ii) Ammonium chloride is a

- (a) Basic salt                      (b) Acidic salt  
(c) Amphoteric salt              (d) Complex salt

(iii) Neutron was discovered by

- (a) J. J. Thomson              (b) Neil Bohr  
(c) Chadwick                      (d) De-Broglie

(iv) In STP the value of temperature is

- (a) 0°C                              (b) 0 K  
(c) 100°C                          (d) -273°C

(v) Hydrogen bond is

- (a) Primary bond  
(b) Secondary bond  
(c) Stronger than covalent bond  
(d) Stronger than ionic bond

5. Match the following :

1×5=5

- |                               |                      |
|-------------------------------|----------------------|
| (a) Dual nature of electron   | (i) Aufbau Principle |
| (b) Atomic structure          | (ii) Salt            |
| (c) Electronic configuration  | (iii) Catalyst       |
| (d) Rate of chemical reaction | (iv) De-Broglie      |
| (e) Neutralisation reaction   | (v) Rutherford       |

### PART – B

Answer any *five* questions.

6. (a) For an ideal gas, prove  $PV = nRT$  4
- (b) Show that Molar volume of all gases is 22.4 litre at STP. 3
- (c) State Dalton's law of Partial pressure. 2



7. (a) Balance the following by Ion exchange method : 3  
$$\text{Cr}_2\text{O}_7^{2-} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2\text{O}$$
- (b) Calculate the amount of carbon dioxide produced from the burning of 24 gram of pure carbon in presence of oxygen. 3
- (c) Give one example of the following :  
oxidizing agent, reducing agent, redox reaction. 3
8. (a) Discuss Rutherford's model of atom. 4
- (b) Write the significances of Quantum numbers. 4
- (c) What is Heisenberg's uncertainty principle ? 1
9. (a) Give the differences between ionic compounds and covalent compounds. 3
- (b) Why sigma bond is stronger than pi bond ? 2
- (c) Calculate the amount of water required to be added to 20 ml 0.13N acid solution to make it 0.10N. 4

10. (a) Give one example each of the following :  
Homogenous catalysis, Catalyst promoter, Enzyme catalyst. 3
- (b) Explain Lowry-Bronsted concept of acid-base. 3
- (c) What is Buffer solution ? Give examples. 3
11. (a) Discuss the Resin method of De-ionisation of water. 5
- (b) How we can sterilize water ? 3
- (c) What is EDTA ? 1