

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
BSc DEGREE EXAMINATION DECEMBER 2019  
(Third Semester)

Branch-CHEMISTRY

**GENERAL CHEMISTRY III**

Time: Three Hours

Maximum: 75 Marks

**SECTION-A (10 Marks)**

Answer ALL questions

ALL questions carry EQUAL marks (10 x 1 = 10)

- Which one of the following compound is called as inorganic benzene?  
(i) Borax (ii) Borazole  
(iii) Diborane (iv) Boric acid
- Find out the molecular formula of permono sulphuric acid from the following,  
(i)  $H_2SO_5$  (ii)  $H_2S_2O_8$   
(iii)  $H_2S_2O_6$  (iv)  $H_2SO_4$
- Identify the flavouring agent from the following compounds.  
(i) Acardein (ii) Glyoxal  
(iii) Vanillin (iv) Glycerol
- O-hydroxy benzoic acid is called as  
(i) cinnamic acid (ii) Acrylic acid  
(iii) Tartaric acid (iv) Salicylic acid
- Mention the anaesthetic agent from the following.  
(i) Ethyl chloride (ii) Chloroform  
(iii) Vinyl Chloride (iv) Carbon tetrachloride
- Ethylene glycol is a \_\_\_\_\_ alcoho.  
(i) monohydric (ii) dihydric  
(iii) trihydric (iv) polyhydric
- What is the efficiency of an engine operating between  $110^\circ C$  and  $25^\circ C$ ?  
(i) 22.2% (ii) 33,3%  
(iii) 44.4 % (iv) 55.5 %
- In a reversible isothermal expansion of a gas, the total entropy change of the system and the surrounding is  
(i) -1 (ii) 0  
(iii) >0 (iv) <0
- Clapeyron - clausius equation is  
(i)  $\left[ \frac{P_2}{P_1} \right] = \frac{\Delta H_{vap}}{R} \left[ \frac{1}{T_2} - \frac{1}{T_1} \right]$  (ii)  $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$   
(iii)  $\Delta G = -RT \ln K$  (iv)  $E = E^\circ - \frac{RT}{F} \ln \frac{Red}{ox}$
- If an equilibrium is subjects to stress, it shifts in such a way to reduce it. This statement is  
(i) Nemst heat theorem (ii) Le Chatelier's principle  
(iii) Carnot theorem (iv) Third law of thermodynamics

Cont...

**SECTION - B (25 Marks)**Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 x 5 = 25)

11 a Classify silicones. Write the preparation of all types of silicones.

OR

b Describe the structure and shape of  $AB_5$  type of interhalogen compound.

12 a Prepare acrolein from glyurol. Outline its properties and uses.

OR

b Analyse the reason why benzaldehyde under goes electrophilic substitution at meta position of a benzene ring.

13 a (i) What are vicinal and geminal dihalides? (2)

(ii) Write preparation and uses of  $CCl_4$ . (3)

OR

b How is phenol obtained from coal tar?

14 a (i) State second law of thermodynamics.

(ii) What are the limitations of first law of thermodynamics? (3)

OR

b Derive Gibbs \_ HelmHoltz equation for a process at constant pressure and at constant temperature.

15 a Explain Nerrist heat theorem.

OR

b Calculate the standard free energy of formation of  $H_2O(l)$ . The standard enthalpy of formation ( $\Delta H^\circ_f$ ) of  $H_2O(l)$  is - 286.20 KJ and standard entropies of  $H_{2(g)}$ ,  $O_{2(g)}$  and  $H_{2O(l)}$  are 130.60, 205.01 and 70.29  $JK^{-1} mol^{-1}$  respectively.**SECTION -C (40 Marks)**Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 x 8 = 40)

16 a Explain the bonding in diborane with all details.

OR

b Outline the preparation, properties and uses of perdisulphuric acid.

17 a List out the chemical properties of acetophenone and benzophenone. (4+4)

OR

b Explain how tartaric acid is prepared from grape juice. Write the reactions involved.

18a Discuss the preparation and properties of ethyl chloride.

OR

b Distinguish between  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  alcohols by lucas and dichromate tests. (4+4)

19 a Explain the different operations of camot cycle.

OR

b Calculate the entropy change accompanying the freezing of one mole of water at  $25^\circ C$  to ice at  $-10^\circ C$ ; Given that the heat of fusion of ice at its fusion point ( $0^\circ C$ ) is  $6.00 KJ mol^{-1}$ , and heat capacity of ice is  $36.82 JK^{-1} mol^{-1}$  and heat capacity of liquid water is  $75.31 JK^{-1} mol^{-1}$ .

20 a Define chemical potential. How is it related to free energy?

OR