B. Tech-1st (Sec-H, I, J, K, L, M, N)

Chemistry-I

Full Mark: 20

Time -2 hours

Answer any four questions including Q.No.1 which is compulsory

The figure in the right hand side margin indicate marks

All parts of the questions should be answered continuously

Answer the following questions 1 x 5]

1.(a) How does the Plank distribution equation explain the black body radiation at lower wavelength?

(b) Write the conditions for a wave function to be called Eigen function.

(c) What is the main criterion for a molecule to Microwave active? Which of the following molecules will show microwave spectrum: N_2, HCl, CCl_4, CO_2.

(d) Calculate the no of possible vibrational modes for CO_2 and benzene molecule.

(e) Write down the energy expressions for allowed vibrational energy level in terms of wavenumber and the selection rules for simple harmonic oscillator and anharmonic oscillator model. Mention the terms used in the expression.

2.(a) What is photoelectric effect? How does it help in explaining failure of classical mechanics? [2.5]

(b) Electrons with a kinetic energy of 6.023×10^4 J/mol are evolved from the surface of a metal, when exposed to a radiation of wavelength of 600 nm during a photoelectric effect experiment. Calculate the work function and stopping potential for the metal atom. [2.5]

3.(a) Write the expression for Zero-point energy for a particle in one dimensional box. Write the significance of the answer. [2]

(b) An electron is confined to a 1 micron thin layer of silicon. Assuming that the semiconductor can be adequately described by a one-dimensional quantum well with infinite walls, calculate the lowest possible energy within the material in units of electron volt. If the energy is interpreted as the kinetic energy of the electron, what is the corresponding electron velocity? (The effective mass of electrons in silicon $m^* = 0.26\ m_0$, where $m_0 = 9.11 \times 10^{-31}$ kg is the free electron rest mass). [3]

4.(a) Derive an expression for bond length of a diatomic molecule (as a rigid rotor) using the application of microwave spectroscopy. [2.5]

b) The first line in the pure rotation spectrum of $^1H^{35}Cl$ appears at 21.18 cm^{-1}. Find out the value of the rotational constant of $^2D^{35}Cl$. Assume the bond length $^2D^{35}Cl$ is same as that of HCl. [2.5]

5.(a) Discuss the basic principle in IR spectroscopy. [2]

b) The fundamental and first overtone transitions of $^{14}N^{16}O$ are centered at 1876.06 cm^{-1} and 3724.20 cm^{-1}, respectively. Evaluate the equilibrium vibrational frequency, the anharmonicity constant, and the force constant of the molecule. [3]

B.Tech-2nd (All Branches)
Chemistry

Full Mark: 20

Time -2 hours

Answer any four questions including Q.No.1 which is compulsory

The figure in the right hand side margin indicate marks

All parts of the questions should be answered continuously

1. Answer the following questions [1 x 5]
   (a) State Rayleigh-Jeans Law.
   (b) Calculate the number of vibrational degrees of freedom of Carbon tetrachloride molecule.
   (c) Calculate the wavelength of an electron that has been accelerated from rest through a potential difference of 1000 V?
   (d) What is the difference between true equilibrium and metastable equilibrium?
   (e) Calculate the no of phases, components and degrees of freedom of aqueous solution Na_2SO_4

2. (a) Show that for longer wavelength Plank's distribution reduces to Rayleigh-Jeans distribution. [2.5]
   (b) Derive the expression for the total energy of an electron confined in a one dimensional box [2. 5]

3. (a) Explain Fluorescence and phosphorescence by using Jablonski diagram. [2.5]

   (b) What is the effect of isotopic substation on the rotational spectra of a diatomic molecule. From the pure rotational spectra of $^{12}C^{16}O$ and $^{13}C^{16}O$, the values of rotational constants for the two have been found to be 1.92118 cm-1 and 1.83669 cm-1 respectively. Calculate the atomic mass of ^{13}C if the atomic masses of ^{12}C and ^{16}O are 12 a.m.u and 15.999 a.m. u respectively [2.5]

4. (a) Sate Gibb's Phase rule and explain the different terms involved in it with suitable example [3]

   (b) The work function of potassium is 3.2 eV. Find out the threshold frequency and maximum wavelength of light which will cause emission of photo electron. [2

5. (a) Draw the phase diagram of Sulphur system and explain the different curves and triple points [3]

   (b) Calculate the transmittance, absorbance and absorption coefficient of a solution which absorbs 90% of a certain wavelength of light beam passed through a 1cm cell containing 0.25M solution [2]

Veer Surendra Sai University of Technology

Mid Semester Examination-2018 **2nd Semester, B. Tech Civil Engineering**

Sub: Environmental Engineering

Max. Marks: 20 **Time: 2hrs.**

Note: Q. No. 1 is compulsory. Answer any three from the rest of questions.

1. **Answer the following questions:** **(1X5)**
   a) Explain Biotic and Abiotic components of ecosystem
   b) What are primary and secondary pollutants
   c) Differentiate between renewable and non renewable sources.
   d) Define environmental auditing.
   e) Define food chain and food web

2.
(a) Describe hydrological cycle with the help of a neat sketch [2.5]
(b) Explain environmental gradient and tolerance curve with suitable sketch? [2.5]

3.
(a) Explain acid rain phenomenon and its effect on environment? [2.5]
(b) Discuss the different components of ecosystem? [2.5]

4.
(a) Give explanation about the level of organisation in an ecosysytem [2.5]
(b) Explain the cause of minamata disease with its effects? [2.5]

5. Explain: (2X2.5)

a) Water balance
b) Energy budget

Veer Surendra Sai University of Technology, Burla
Mid-Semester Examination 2017

Subject: Computer programming Time: 2hr

Section: A,B,C,D,E,F,G(2nd Semester) Full Mark: 20

Answer Any four question including question number 1.

1. a. Convert the following: [1X5=05]
   (i) $(1111000111100010)_2 = (\quad)_{16}$
   (ii) $(12345)_8 = (\quad)_2$

   b. Explain the difference between declaration and definition of variables.

   c. Find the output:

```
void main( ) {
    int x = 10, y = 20, res;
    res=y++ + x++;
    res+=++y + ++x;
    printf("\n x=%d  Result=%d", x, res); }
```

   d. Find error(s) in the following codes:

(i)

```
int main()
{
  int i = 0;
  for(i = 0; i < 3; i++);
  {
    printf("loop ");
    continue;
  }
  getchar();
  return 0; }
```

(ii)

```
main()
{
   int i=1;
   do
   {
      printf("%d",i);
      i++;
   }while(i=10);
}
```

   e. Define typecasting with suitable example.

2. a. Write a program to print the factorial of a number. [2X2.5]

   b. Describe the block architecture of a computer with a suitable figure.

3. a. Write an algorithm to find sum of first N natural numbers. [2X2.5]

   b. Draw a flowchart to check whether a number is prime or not.

4. a. Explain the terms variable and constants. Describe the data types supported by C? [2X2.5]

   b. Write a C program to check if a number is odd or even using conditional (ternary) operator.

5. a. Explain the use of break and continue with examples. [2X2.5]

   b. Write a C program to print the following pattern.

```
1
2 2
3 3 3
4 4 4 4
```

6. a. Explain Enumerated data type with syntax and appropriate examples. [2X2.5]

   b. Write a program to determine whether an entered character is a vowel or not using switch-case.

Veer Surendra Sai University of Technology
Department of Electronics and Telecommunication Engineering
Mid Term Examination, February 2018
2nd Semester, B.Tech
Sub: Basic Electronics

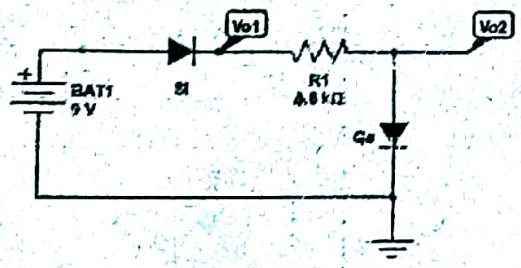
Full Marks: 20 **Time: 2 Hrs.**

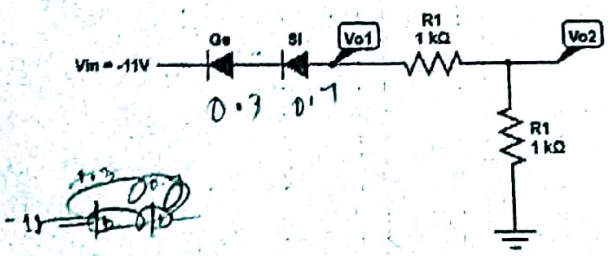
Answer any four questions including question-1 :

1. Short type questions : [1×5]
   a) Draw the integrator circuit and its output waveform for a square wave input signal ?
   b) $(101.11)_{10} = (\quad)_2 = (\quad)_8$?
   c) Subtract $(11011)_2$ from $(10111)_2$ using 2's complement method?
   d) Write the diode current equation, and explain each parameter in the expression.
   e) Draw the frequency spectrum of the signal $x(t) = 4\cos(2\pi t) + 2.5\cos(4\pi t) + \cos(6\pi t) + 0.5\cos(10\pi t)$.

2. a) Draw the high pass filter circuit and write the expression for its input-output relation. State the condition for which it will act as a differentiator circuit. Justify it. [2.5]
   b) The reverse saturation current at 25°C for Si- diode with η=2 is 10μA. Find the voltage to be applied across the diode for forward current of 60 mA. [2.5]

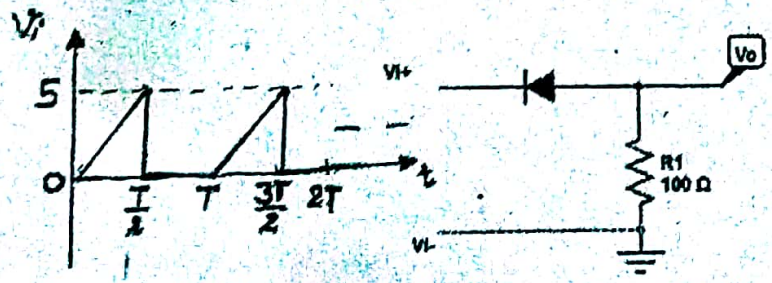
3. a) Determine I_D, V_{o1} and V_{o2} for the given networks. Give details of calculation and reasoning: [3]





   b) Derive the average and rms voltage of a half wave rectified sinusoidal signal. [2]

4. a) Sketch the output V_o & determine the dc voltage of the output for the shown network. [2.5]
   b) Repeat the problem (a) by replacing the ideal diode with a Si-diode. [2.5]



5. a) What is *dynamic ac resistance* of a diode? Show that the dynamic *ac* resistance of a diode is given by : $r_d = \frac{26mV}{I_D}$. [2.5]
   b) Solve the following in binary equivalent form: [2.5]
      I. $(47)_{10} \div (12)_{10}$
      II. $(45)_{10} \times (31)_{10}$

6. Write short notes(any two): [2.5×2]
   a) Load line
   b) Intrinsic vs. Extrinsic semiconductors
   c) Base or radix of a number system
   d) Depletion region

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY
MID SEMESTER EXAMINATION ODD 2017

Subject: **Computer Programming** Time: **2 Hours**
1st Semester (B.Tech.) – **Sec: H, I, J, K, L, M, N** Max Marks: **20**

Answer any four questions including question number 1.

SECTION-A **[1 x 5]**

1. a) Convert the following:
   (i) $(11001011)_2 = (\quad)_{16}$
   (ii) $(5427)_8 = (\quad)_2$
   b) Differentiate between syntax error and logical error with a suitable example.
   c) Find the output:

```
int x = 3, y = 5, z = 7;
int a, b;
a = x * 2 + y / 5 – z * y;
b = ++x * (y - 3) / 2 – z++ * y;
printf("a = %d b = %d", a, b);
```

   d) Find error(s) in the following codes:

(i)	(ii)

int a = 9;
float y = 2.0;
a = b % y;
printf("%d", a);
	int i = 1, j;
	while(j >= 10)
	{
	printf("%d", i);
	i++;
	}

   e) What is a program language translator? Differentiate between a compiler and an interpreter.

SECTION-B

1. **[2.5 x 2]**
   a. Describe the steps involved in compilation and execution of a C program with a suitable figure.
   b. Describe the block architecture of a computer with a suitable figure.

2. **[2.5 x 2]**
   a. Write an algorithm to classify a given number as prime or composite.
   b. Draw a flowchart using loop construct to calculate factorial of a number.

3. **[2.5 x 2]**
   a. Write a C program to check whether a year is a leap year or not.
   b. Explain Enumerated data type with syntax and appropriate examples.

4. [2.5 x 2]

a. Write a C program to calculate the grade of a student by considering the following range of marks using switch-case statement.

Grades=
- **O, 90 ≤ Marks ≤100**
- **E, 80 ≤Marks < 90**
- **A, 70 ≤Marks < 80**
- **B, 60 ≤Marks < 70**
- **C, 50 ≤Marks < 60**
- **D, 40 ≤Marks < 50**
- **F, Otherwise**

b. What do you mean by an operator? Explain different types of operators with suitable examples.

5. [2.5 x 2]

a. Write a program in C to find the commission from the sales amount of following data.

Sales amount in (RS)	Commission in %
Less than 1000	No commission
Above 1000 and below 2000	8% of sales amount
Above 2000 and below 5000	10% of sales amount
Above 5000 and below 8000	15 % of sales amount
Above 8000	20% of sales amount

b. Write a C program to find the greatest of six numbers using while loop and conditional (ternary) operator.

6. [2.5 x 2]

a. Write a C program to count the numbers in the range from 1 to 100 that is divisible by two using while loop.

b. Write a C program to calculate the roots of a quadratic equation using if-else-if statement for all possible values of the determinant (D).

----------Best of Luck----------

Veer Surendra Sai University of Technology, Burla
Mid-Semester Examination 2017

Subject: Computer programming Time: 2hr

Section: A,B,C,D,E,F,G(2nd Semester) Full Mark: 20

Answer Any four question including question number 1.

[1X5=05]

1. a. Convert the following:
(i) $(1111000111100010)_2 = (\quad)_{16}$
(ii) $(12345)_8 = (\quad)_2$

b. Explain the difference between declaration and definition of variables.

c. Find the output:

```
void main( ) {
    int x = 10, y = 20, res;
    res=y++ + x++;
    res+=++y + ++x;
    printf("\n x=%d  Result=%d", x, res); }
```

d. Find error(s) in the following codes:

(i)

```
int main()
{
  int i = 0;
   for(i = 0; i < 3; i++);
   {
     printf("loop ");
     continue;
   }
  getchar();
  return 0; }
```

(ii)

```
main()
{
    int i=1;
    do
    {
        printf("%d",i);
        i++;
    }while(i=10)
}
```

e. Define typecasting with suitable example.

2. a. Write a program to print the factorial of a number. [2X2.5]

b. Describe the block architecture of a computer with a suitable figure.

3. a. Write an algorithm to find sum of first N natural numbers. [2X2.5]

b. Draw a flowchart to check whether a number is prime or not.

4. a. Explain the terms variable and constants. Describe the data types supported by C? [2X2.5]

b. Write a C program to check if a number is odd or even using conditional (ternary) operator. ? :

5. a. Explain the use of break and continue with examples. [2X2.5]

b. Write a C program to print the following pattern.

```
1
2 2
3 3 3
4 4 4 4
```

6. a. Explain Enumerated data type with syntax and appropriate examples. [2X2.5]

b. Write a program to determine whether an entered character is a vowel or not using switch-case.

B.Tech 1st Semester, Section: [redacted] N
Sub: Chemistry-1
Question Bank/Assignemnt:2

Topics: Thermodynamics and chemical equilibrium: variables of states: 1st law of thermodynamics and applications to ideal gas. enthalpy and heat capacity. Measurement of enthalpy and heat capacity. thermo-chemical calculation 2nd law of thermodynamics concepts of entropy. entropy in physical and chemical changes. molecular interpretation of entropy. The free energy concepts: application to gases: Gibbs Helmholtz equation: free energy change and criterion of spontaneity of chemical equation: free energy change and criterion of spontaneity of chemical reactions and chemical equilibrium. Physical, ionic and chemical equilibrium. (No of lecturers- 9)

Section A: (Short Answer type questions)

1. What are the sign conversion for work done, heat, and entropy of a system?
2. For one mole of ideal gas T=f (P, V). show that dT is perfect differential.(3) (BPUT 2003)
3. If V=f (P. T). then Show that dV is an exact differential for an ideal gas. (2) (BPUT april-05)
4. For one mole of ideal gas. writing V as a function of temperature and pressure. Show that ∂V is exact diffential. (4) (2nd semester 2010)
5. Show that for an one mole of ideal gas. $[\partial P/\partial V]_T \times [\partial V/\partial T]_P \times [\partial T/\partial P]_V = -1$(3) (2nd semester 2010)
6. If dU=TdS-PdV. then show that. $(\partial T/\partial V)_S = -(\partial P/\partial S)_V$ (3) (BPUT 2003)
7. Show that :$(\partial S/\partial P)_T = -(\partial V/\partial T)_P$ (3) (BPUT april-05)
8. Show that $C_p - C_v = [V-(\partial H/\partial P)_T](\partial P/\partial T)_V$.(4) (BPUT 2003)
9. Show that: $W_{rev} > W_{irr}$ for an ideal gas. (3) (BPUT april-05)
10. Write the value of work done in free expansion.
11. Show that $(\partial T/\partial P)_S = (\partial V/\partial S)_P$ (4) (BPUT June05)
12. Show that $C_P - C_V = [V-(\partial H/\partial P)_T](\partial P/\partial T)_V$ (4) (BPUT June05)
13. Show that $(\partial G/\partial T)_P = -S$ (4) (2nd semester06)
14. Show that $\partial G = V\partial P - S\,\partial T$(2) (2nd semester 2010)
15. If $\partial H = T\partial S + V\partial P$: Then show that $[\partial T/\partial P]_S = [\partial V/\partial S]_P$(3) (2nd semester 2010)
16. What do you mean by extensive and intensive properties? Explain with example.(2) (2nd semester 2010)
17. Write the value of entropy and free energy at equilibrium. for spontaneous and non- spontaneous process.
18. What is Hess's law?
19. What is Kirchoff's law for heat of reaction.
20. Give two applications of Le-chatellier's principle.
21. What is law of mass action?
22. State different types of equilibrium constant and find relation between Kp and Kc.
23. Explain different characteristics of equilibrium constant.
24. State the Criteria of Spontaneity and equilibrium for chemical reaction under: i. Constant Pressure and temperature. ii. Constant volume and temperature.
25. Predict the effect of increased pressure and temperature on the following reaction equilibria stating only whether the product formation will be favoured, inhibited or unchanged? i. $2SO_2(g) + O_2(g) = 2SO_3(g)$ $\Delta H^0 = -194.0$ kJ. ii. $N_2(g) + O_2(g) = 2NO(g)$ $\Delta H^0 = +361.0$ kJ
26. In which of the following reactions Kp is greater than Kc?
    i. $PCl_5(g) \rightleftharpoons Cl_2(g) + PCl_3(g)$
    ii. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

iii. $2SO_3(g) \leftrightarrow 2SO_2(g) + O_2(g)$
iv. $H_2(g) + I_2(g) \leftrightarrow 2HI(g)$

27. In Heber's process of manufacturing ammonia Molybdenum act as (i) Catalyst (ii)promoter iii)inhibitor.
28. Which of the followin_ conditions will shift the equilibrium of an exothermic reaction towards right: lowering/ increasing/ or keeping fixed the temperature
29. Predict the effect of increased pressure and temperature on the following reaction equilibria stating only whether the product formation will be favoured. inhibited or unchanged? i. $2SO_2$ (G0 + $O_2(g)$ = $2SO_3(g)$ ΔH^0 = -194.0 kJ; ii. $N_2(g) + O_2(g) = 2NO(g)$ ΔH^0 = +361.0 kJ
30. Write the effect of increasing the pressure on the reaction $2A+3B \leftrightarrow 3C+2D$.

Section B Long Answer type questions

1. Define first law of thermodynamics. Write its mathematical expression.
2. Compare the work done in reversible isothermal and adiabatic expansion process.
3. What is Born-Haber cycle? Explain how Hess's law is applied in formation of NaCl by Born-Haber cycle?
4. Write the limitations of first law of thermodynamics. How is it rectified by second law of thermodynamics?
5. What is Le-chatellier's principle? Briefly describe it with examples.

Section – C (Problems)

1. Calculate $\Delta S.\Delta A.\Delta G$ for the vaporization of 2 moles of liquid benzene at its boiling point of 80.2°C.Assuming ideal gas behavior for the benzene vapour.(Given the latent heat of vaporisation.L_v=101cal/gm. Mol.Wt of benzene=78) (4)
2. 5 moles of monatomic ideal gas are compressed reversibly and adiabaticaly.The initial volume is 6 dm^3 and the final volume is 2 dm^3. The initial temperature is27°C. (i) What would be the final temperture in this process.(ii)Calculate w.q andΔU for the process. Given C_v=20.91 J/mol/K.
3. At NTP2.8 liters of oxygen were mixed with 19.6 litre of hydrogen. Calculate the increase in entropy. (Assuming ideal gas behavior). (4) (BPUT 2003)
4. Find the heat of formation of SO_2 (g) from the following reactions:
$S_{(S)} + 3/2\ O_{2(g)} \rightarrow SO_3$ (g) +2xkcal. SO_2 (g) +1/2 O_2 (g) $\rightarrow SO_3$ (g) +Ykcal (2)
5. If the heats of formation of CO_2 (g) and H_2O(l) are -393.5kJ/mol and -285.8KJ/mol respectively and the heat of combustion of C_3H_8(g) is -2220.2kJ/mol. Find the standard heat of formation of C_3H_8(g).(BPUT-04)
6. Find the enthalpy change, entropy change and free energy change accompanying the vaporization of 1 mole of water at 100°C and 1atm.pressure. if the L_v of water is 540 cal/gm. (4) (BPUTdec-04)
7. Heat of neutralization of the NH_4OH and CH_3COOH is 41.46kJ/mol. Calculate ΔH^0_{ion}=-57.1 of NH4OH (for strong acid and strong base ΔH^0_{neut}=-57.1kJ/mol) (2)(BPUT april-05)
8. Two moles of an ideal gas at one atm.Pressure and 27°C undergoes the following process :(i) heat is absorbed at constant volume till the Pressure is doubled. (ii) Isothermal and reversible expansion till the Pressure is reduced to 0.8atm. (iii) Adiabatic compression till initial stage is achived. Calculate $\Delta E.Q>W$ for the total cycle. (C_V=40J/K/mol). (4) (BPUT April-05)
9. Calculate (i) ΔG^0 and (ii) minimum temperature at which the reaction is reversible for the reaction. $H_2S_{(g)} + O_{2(g)} = H_2O_{(l)} + SO_{2(g)}$ from the following data:ΔH^0_f ($H_2S_{(g)}$) =-20.15kj/mol. ΔH^0_f ($H_2O_{(l)}$) =-285.84KJ/mol. ΔH^0_f ($SO_{2(g)}$) =-296.9KJ/mol. S_0 (O_2) =205.03J/mol. S09 (H_2O) =69.92J/mol. S0 (S[illegible]) =248.53J/mol (4) (BPUT April 05)

10. Calculate the standard enthalpy of combustion of n-butane from the following data
$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta H^0 = -393$kj/mol
$H_{2(g)} + 1/2 CO_{2(g)} \rightarrow H_2O_{(l)}$
$4C_{(s)} + 5H_{(g)} \rightarrow C_4H_{10(g)}$ $\Delta H^0 = -126$kJ/mol (2)
11. One mole of an ideal gas at 70K is expanded reversibly and adiabatically from 1 dm^3 to 10dm^3.calculate ΔE.ΔH and W.(C_v=20.92J/K) (4) (BPUT June05)
12. Five moles of each ofA and B are mixed together at one atm. Pressure and at300K.Calculate ΔG.ΔH and SΔ of mixing assuming that A and B form ideal mixture (4) (BPUT June05)
13. Find out the changes in Gibbs and Helmholtz free energy when 4 moles of an ideal gas are compressed isothermally and reversibly from 5atm to1 atm at 323K.(5)(BPUT dec.06)
14. (i) For a reaction. ΔH and ΔS both are positive. Under what condition will the reaction be spontaneous? 2 (ii) How is standard free energy change related to the equilibrium constant? (2)(2nd semester06)
15. Calculate the free energy change which occurs when one mole of an ideal gas expands reversibly and isothermally at 300K from an initial volume of 5 liter to 50 liters.(3) (2nd semester06)
16. Calculate the temperature above which it is possible to reduce MgO using Carbon from the following data. For the reaction,
$MgO(S) + C(S) \rightarrow Mg(S) + CO(g)$, $\Delta H^0 = +491.18$ KJ mol^{-1} and $\Delta S^0 = +197.67$ JK^{-1} mol^{-1}
17. Define heat of neutralization.(2) (2nd semester 2010)
18. Two moles of ideal gas allowed to expand reversibly and isothermally at 300^0 k from a pressure 1 atm to pressure 0.1 atm. What is the change in Gibb's free energy? (2) (2nd semester 2010)
19. The heat liberated on complete combustion of 7.8 gm benzene is 327 kj. The heat has been measured at constant volume and at 27^0 .Calculate heat of combustion of benzene at constant pressure at 27^0(R= 8.3J $mol^{-1}K^{-1}$.) (2nd semester 2010)
20. What do you mean by lattice energy / Explain with suitable example how lattice energy calculated with help of Born Harber cycle.(4) (2nd semester 2010)
21. The heat of the reaction for $N_2 + 3H_2 \rightarrow 2NH_3$ at 27^0C is -91.94 Kj. What will be it value at 50^0 C? The molar heat capacities at6 constant pressure and 27^0C For N_2,H_2, and NH_3 are 28.45,28.32 and 37.07joules respectively.(3) (2nd semester 2010)

22. Find the heat of formation of SO_2 (g) From the following reaction

$S(s) + 3/2\ O_{2(g)} \rightarrow SO_{3(g)} + 2x$Kcal, $SO_{2(g)} + 1/2\ O_2\ (g) \rightarrow SO_3\ (g) + y$ Kcal .

23. If the heats of formation of CO_2 (g) and H_2O (l) are 393.5 KJ \ mole and –285.8 KJ \mole respectively and the heat of combustion of C_3H_8 (g) is –2220.2 KJ \ mole . Find the standard heat of formation of $C_3H_{8(g)}$.
24. Find the enthalpy change entropy change and free energy change. accompanying the Vaporization of 1mole of water at 100° c and 1atm pressure, if the latent heat of vaporizing atom of water is 540 cal/ gm.
25. One mole of H_2, two moles of I_2 and three moles of HI are injected into one litre sealed glass vessel. What will be the concentration of H_2,I_2 and HI at equilibrium at 560^0C.if the value of the equilibrium constant for this reaction is 47.35 at the same temperature.
26. Consider the following dissociation reaction $PCl_5 = PCl_3 + Cl_2$, calculate the pressure necessary (in atmosphere) necessary to obtain a 50% dissociation of PCl_5 at 2800C. the equilibrium constant for the reaction Kp = 1.8.
27. One mole of Br_2(g) is enclosed in a 1dm^3 vessel and was 1%dissociated at 1750 K. Calculate K_c and Kp for dissociation of Br_2(g).
28. Heat of neutralization of NH_4OH and CH_3COOH is 51.46 Kj/mol. Calculate ΔH°ion of NH_4OH.(for strong acid and strong base $\Delta H^\circ neut = -57.1$ Kj/mol.)

29. Calculate the standard enthalpy of combustion of n-butane from the following data:

$C(s) + O_2(g) \rightarrow CO_2(g)$, $\Delta H^\circ = -393$ kj/mol.
$H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l)$, $\Delta H^\circ = -286$ kj/mol.
$4C(s) + 5H_2(g) \rightarrow C_4H_{10}(g)$, $\Delta H^\circ = -126$Kj/mol.

30. The equilibrium constant Kp for the reaction $PCl_3(g) + Cl_2 \Leftrightarrow PCl_5(g)$ is2.95 at 400K.Calculate the amount of PCl_5 formed when one mole of $Cl_2$and 2 moles of PCl_3 are taken. Equilibrium pressure is one atmosphere.
31. The equilibrium constant for isomerisation of n-butane to isobutene is 2.54 at 300K.Calculate the percentage of isomerisation of n-butane.
32. N_2 & H_2 were added to 5 liter flask at 227K.The equilibrium mixture contained 18.7g NH_3. 0.16gH_2. 3.36g N_2.Calculate Kc for the reaction.
33. When ethanol and acetic acid were mixed together in equimolar proportion 66.6%of the mixture is converted into ethyl acetate. Calculate Kc. Also calculate quantity of ester produced if one mole of acetic acid is treated with 0.5 moles of alcohol.
34. The equilibrium constant for the esterification of acetic acid and ethanol at room temp is 4.How much ester will be present in the mixture if 120g of acetic acid and 92g of ethanol are taken ?