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Hall Ticket Number:

CD/CE/CM/CO/EE/ME112 (R20)

B.TECH. DEGREE EXAMINATION, DECEMBER-2024

Semester I [First Year] (Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is the electrolyte in Dry cell? CO1
   (b) What is hydrogen bonding? CO1
   (c) Write the CFSE formula for octahedral complex CO1
   (d) Define Osmosis. CO2
   (e) Give example for coagulant reagent. CO2
   (f) How acid affects the metal corrosion. CO2
   (g) Define degree of polymerization. CO3
   (h) Write Diels Alder reaction CO3
   (i) What are the uses of conducting polymers? CO3
   (j) Define Beer Lamberts law. CO4
   (k) What is Bathochromic effect? CO4
   (l) Which molecules are IR active? CO4
   (m) Write two Fluorescence applications in medical field. CO4
   (n) Give example for bending vibration. CO4

UNIT – I

2. (a) Describe the salient features of CFT. Explain the splitting of d-orbitals in tetrahedral & octahedral environments by Crystal field theory. (7M) CO1
   (b) How Lead acid battery is better than Dry cell and writes discharging cell reactions involved in Lead acid battery. (7M) CO1

(OR)

3. (a) Write construction and working principle of Li-Ion battery. (7M) CO1
   (b) Explain the magnetic properties of $[Cu(NH_3)_4]^{2+}$ and $[Co(NH_3)_6]^{3+}$ complexes taking NH_3 as strong field ligand. (7M) CO1

UNIT – II

4. (a) Explain Ion-exchange method for softening water. (7M) CO2
   (b) Explain about Sacrificial anodic protection method and impressed current cathodic protection. (7M) CO2

(OR)

5. (a) (i) Define differential aeration corrosion.
   (ii) Write about electroplating (Cu). (7M) CO2
   (b) What are the steps involved in municipal water treatment? (7M) CO2

UNIT – III

6. (a) Explain the synthesis of Aspirin. (7M) CO3
   (b) (i) How addition polymer is weaker than condensation polymer (ii) Give examples for addition polymer and condensation polymer. (7M) CO3

(OR)

7. (a) Write about P-doped and N-doped mechanism in conducting polymers. (7M) CO3
   (b) Write the differences between E1 and E2 reactions. (7M) CO3

UNIT – IV

8. (a) Write the principle involved in UV-VIS spectroscopy and write its limits. (7M) CO4
   (b) Write all stretching and bending vibration in IR spectroscopy. (7M) CO4

(OR)

9. (a) Explain colorimetric determination of Fe(III). (7M) CO4
   (b) How IR helps to determine the structure of H_2O and CO_2. (7M) CO4

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CD/CE/CM/CO/EE/ME112 (R20)

(b) (i) What is bathochromic shift? Explain with an example.
(ii) What is hyperchromic shift? Explain with an example. (7M) CO4

(OR)

9. (a) What is the condition necessary for a compound to be IR active? Draw different modes of vibrations possible in a triatomic molecule. (7M) CO4
(b) Describe the phenomenon of 'fluorescence' using Jablonski's diagram. Mark the non-radiative decay pathways. (7M) CO4

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CD/CE/CM/CO/EE/ME112 (R20)

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Hall Ticket Number:

CD/CE/CM/CO/EE/ME112 (R20)

B.TECH. DEGREE EXAMINATION, APRIL-2024

Semester I [First Year] (Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
(a) Define 'spectrochemical series'. What is the importance of it? CO1
(b) Why d-orbital splitting is reversed in the crystal field splitting of the tetrahedral compared to octahedral? CO1
(c) What happens when a zinc rod is dipped in a solution of aqueous copper sulphate? CO1
(d) What is the disinfection of water? CO2
(e) Why does a part of a nail inside the wood undergo corrosion easily? CO2
(f) How would you regenerate the exhausted cation exchange resin in the Ion-exchange process? CO2
(g) What is 'Markonikoff's rule'? Give an example. CO3
(h) What kind of solvents are used for SN^1 reactions? CO3
(i) What is meant by 'Dienophile'? Give an example. CO3
(j) Name two factors that effect the 'Glass Transition Temperature'. CO3
(k) Why 'photo-multiplier tube (PMT)' is better than a 'phototube' as a detector in the absorption spectrophotometer? CO4
(l) Name the possible electronic transitions that occur in 'ethylene'? CO4
(m) Name two sources that are commonly used in IR spectrophotometer. CO4
(n) How many normal modes of vibrations expected for carbon dioxide molecule? CO4

UNIT – I

2. (a) (i) Calculate the magnetic moment of the metal ions having d^5 and d^7 configurations of an octahedral and tetrahedral complexes under strong field ligand.
   (ii) What are the applications of 'crystal field theory'? (7M) CO1
   (b) Describe Andrew's isotherm for CO_2 with proper representation. (7M) CO1

(OR)

3. (a) (i) What is electrochemical series? Give its applications.
   (ii) Calculate the emf of the following cell and write the cell reaction
   $Zn(s)|Zn^{2+}(0.1M)||Ag^{+}(0.01M)/Ag(s)$
   Given $E^{o}_{Zn^{2+}|Zn} = -0.76\ V, E^{o}_{Ag^{+}|Ag} = +0.80\ V$ (7M) CO1
   (b) What is a fuel cell? Explain H_2-O_2 fuel cell in detail with a neat diagram along with the reactions at the anode, cathode, and overall cell reaction. (7M) CO1

UNIT – II

4. (a) What is reverse osmosis? Explain the purification of seawater by reverse osmosis with a neat labelled diagram along with its advantages (7M) CO2
   (b) What are WHO standards of potable water? Explain various steps involved in the removal of impurities in the municipal treatment of water for domestic purposes. (7M) CO2

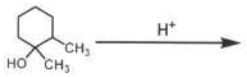
(OR)

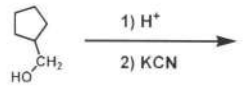
5. (a) Explain the electrochemical theory of corrosion along with the mechanism involved in rusting of iron in an acidic medium with a diagram. (7M) CO2

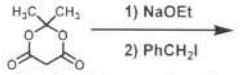
   (b) Explain the galvanic corrosion and differential aeration corrosion with suitable examples. (7M) CO2

UNIT – III

6. (a) Write the products for the following reactions. Show the mechanism of formation. (7M) CO3



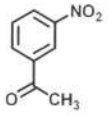




   (b) What are 'extrinsically conducting polymers'? Give example. (7M) CO3

(OR)

7. (a) Propose a plausible mechanism for the synthesis of the following compound. (7M) CO3



   (b) What is meant by 'condensation polymerization'? Explain it with an example. (7M) CO3

UNIT – IV

8. (a) A compound A exhibits molar absorptivity, $\varepsilon = 2.01\ Lmol^{-1}cm^{-1}$ in an absorption spectrophotometer of cuvette length 1.0 cm, what is the concentration of the solution if (7M) CO4
   (i) The absorbance is 0.804?
   (ii) The % transmittance is 50.0?

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Hall Ticket Number:

CD/CE/CM/CO/EE/ME112 (R20)

B.TECH. DEGREE EXAMINATION, JANUARY-2024

Semester I [First Year] (Regular & Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Define secondary cell. CO1
   (b) What is hydrogen bonding? CO1
   (c) What are the uses of Crystal field theory? CO1
   (d) Define scale and sludge. CO2
   (e) What is coagulation? CO2
   (f) Write anodic reaction when zinc metal in HCl solution. CO2
   (g) Define degree of polymerization. CO3
   (h) Write Diel's-Alder reaction. CO3
   (i) What are the uses of conducting polymers? CO3
   (j) What is hypochromic effect? CO4
   (k) Define Beer Lambert's law. CO4
   (l) Give example for bending vibration. CO4
   (m) Define Fluorescence. CO4
   (n) Which molecules are IR active? CO4

UNIT – I

2. (a) Explain the magnetic properties of $[Cu(NH_3)_4]^{2+}$ and $[Co(NH_3)_6]^{3+}$ complexes taking NH_3 as strong field ligand. (7M) CO1
   (b) How Lead acid battery is better than Dry cell and writes discharging cell reactions involved in Lead acid battery. (7M) CO1

(OR)

3. (a) Write construction and working principle of Li-Ion battery. (7M) CO1
   (b) Describe the salient features of CFT. Explain the splitting of d-orbitals in tetrahedral and octahedral environments by Crystal field theory. (7M) CO1

UNIT – II

4. (a) What are the steps involved in municipal water treatment. (7M) CO2
   (b) Explain about Sacrificial anodic protection method and impressed current cathodic protection. (7M) CO2

(OR)

5. (a) Explain Ion-exchange method for softening water (7M) CO2
   (b) (i) Define Galvanic corrosion.
   (ii) Write about electroplating (Cu). (7M) CO2

UNIT – III

6. (a) Write the differences between E1 and E2 reactions (7M) CO3
   (b) (i) How addition polymer is weaker than condensation polymer.
   (ii) Give examples for addition polymer and condensation polymer. (7M) CO3

(OR)

7. (a) Write about P-doped and N-doped mechanism in conducting polymers. (7M) CO3
   (b) Explain the synthesis of Aspirin. (7M) CO3

UNIT – IV

8. (a) Write the principle involved in UV-Vis spectroscopy and write its limits. (7M) CO4
   (b) How IR helps to determine the structure of H_2O and CO_2 (7M) CO4

(OR)

9. (a) Write all stretching and bending vibration in IR spectroscopy. (7M) CO4
   (b) Explain colorimetric determination of Fe(III). (7M) CO4

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CD/CE/CM/CO/EE/ME112 (R20)

F-2

Hall Ticket Number:

CD/CE/CM/CO/EE/ME112 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester I [First Year] (Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is crystal field splitting energy? CO1
   (b) Give the critical temperature of CO_2 in Andrews Isotherm? CO1
   (c) Define Electrochemical series. CO1
   (d) Illustrate the use of coagulants in water treatment process. CO2
   (e) What is dechlorination? CO2
   (f) Nuts and bolts are to be made of the same metal. Give reason CO2
   (g) State the principle involved in a fuel cell. CO2
   (h) What is Markownikoff's rule? Give example. CO3
   (i) Classify polymers based on Tactility? CO3
   (j) List out two factors that affect glass transition temperature. CO3
   (k) What are Elastomers? Give example. CO3
   (l) State Beer -lamberts law. CO4
   (m) Methane does not absorb IR energy. Why? CO4
   (n) What is Fluorescence? CO4

UNIT – I

2. (a) Describe crystal field splitting in Tetrahedral complexes. (8M) CO1
   (b) Discuss briefly the magnetic properties in complex compounds. (6M) CO1

(OR)

3. (a) List out the differences between primary, secondary and fuel cell batteries. (6M) CO1
   (b) Explain the principle and working of lithium ion battery with equations. (8M) CO1

UNIT – II

4. Discuss briefly the various steps involved in the Municipal water treatment of drinking water. CO2

(OR)

5. (a) Describe the mechanism involved in the rusting of iron by electro chemical corrosion theory. (8M) CO2
   (b) Explain cathodic protection by sacrificial anode protection method. (6M) CO2

UNIT – III

6. (a) Explain the synthesis of Aspirin. (7M) CO3
   (b) List out the differences between addition and condensation polymerization. (7M) CO3

(OR)

7. (a) What are conducting polymers? How are they classified? List out their applications. (6M) CO3
   (b) Discuss the mechanism of conduction in Polyacetylene. (8M) CO3

UNIT – IV

8. (a) Explain the basic components of UV spectroscopy and give the various types of electronic transitions that take place in UV spectroscopy. (7M) CO4
   (b) Discus the applications of UV spectroscopy. (7M) CO4

(OR)

9. (a) Explain the basic components of IR spectroscopy and give various modes of vibrations of AB_2. (7M) CO4
   (b) Discuss the IR spectrum of CO_2 molecule. (7M) CO4

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Hall Ticket Number:

CD/CE/CM/CO/EE/ME112 (R20)

B.TECH. DEGREE EXAMINATION, MARCH-2023

Semester I [First Year] (Regular & Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is the crystal field stabilization energy? CO1
   (b) Define hydrogen bonding and mention the types. CO1
   (c) What are the components of dry cell? CO1
   (d) Write any TWO differences between primary and secondary batteries. CO1
   (e) What is coagulation? CO2
   (f) What is sacrificial anode method? CO2
   (g) Define electroless plating. CO2
   (h) Identify any differences between SN^1 and SN^2 reactions. CO3
   (i) Define Markownikoff's rule. CO3
   (j) Define the functionality of a monomer. CO3
   (k) Write TWO examples for addition polymers. CO3
   (l) Write any TWO applications of Fluorescence in medicine. CO4
   (m) What are blue shift and red shift in electronic spectroscopy? CO4
   (n) Write any TWO applications of UV-Vis spectroscopy. CO4

UNIT – I

2. (a) Explain crystal field splitting of d-orbital in octahedral complexes. (7M) CO1
   (b) Define electrode potential. Derive Nernst equation for the determination of single electrode potential. (7M) CO1

(OR)

3. (a) Describe Andrew's isotherm of CO_2 with a neat diagram. Define hydrogen bonding. (7M) CO1
   (b) Summarize the construction and working of Li-MnO_2 battery with suitable chemical reaction. (7M) CO1

UNIT – II

4. (a) Describe the Ion-Exchange process for the purification of water with neat diagram. (8M) CO2
   (b) Explain the theory of electrochemical corrosion with example. (6M) CO2

(OR)

5. (a) Illustrate the steps involved in the municipal water treatment. (8M) CO2
   (b) Discuss the factors effecting rate of corrosion. (6M) CO2

UNIT – III

6. (a) Outline the steps involved in the synthesis of aspirin with suitable mechanism. (7M) CO3
   (b) Differentiate addition and condensation polymerisation. (7M) CO3

(OR)

7. (a) Differentiate SN1 and E1 reaction. (7M) CO3
   (b) Explain the mechanism of conduction in polyacetylene. (7M) CO3

UNIT – IV

8. (a) Explain Beer-Lambert's law of absorption and discuss its limitations. (7M) CO4
   (b) Describe the instrumentation of IR spectroscopy and its components with the help of block diagram. (7M) CO4

(OR)

9. (a) Explain various electronic transitions observed in UV-Visible spectroscopy. (7M) CO4
   (b) Explain the vibrational modes of AB_2 molecule (7M) CO4

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File-2

Hall Ticket Number:

CE/EE/ME112(R20)

B.TECH. DEGREE EXAMINATION, MARCH-2022

Semester I [First Year] (Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Arrange the following ligands in the order of increasing field-strength,
   (i)CO (ii) NH_3 (iii) H_2O CO1
   (b) Why crystal field splitting of tetrahedral complexes is less than octahedral complexes? CO1
   (c) Name the electrolyte used in Li-MnO_2 batteries. CO1
   (d) Write the Nernst equation for single electrode potential. CO1
   (e) Recall various steps involved in water treatment for drinking purpose. CO2
   (f) Why does corrosion occur in steel pipe connected to copper plumbing? CO2
   (g) What is meant by over voltage? CO2
   (h) State Markownikoff's rule. CO3
   (i) Give any two examples for intrinsically conducting polymers. CO3
   (j) How polymers are classified based on tacticity? CO3
   (k) What is meant by step growth polymerization? CO3
   (l) Define chromophore. CO4
   (m) How many vibrational modes are possible for CO_2 molecule? CO4
   (n) Which type of detector is used in IR spectrophotometer? CO4

UNIT – I

2. (a) Explain the crystal field splitting of d-orbitals in octahedral complexes of transition metals. (7M) CO1
   (b) What is meant by electrochemical series? Explain its significance. (7M) CO1

(OR)

3. (a) Describe the construction and working of lead-acid battery with reactions occurred during discharging and charging. (7M) CO1
   (b) Define fuel cell. Explain the construction and working of H_2-O_2 fuel cell and its applications. (7M) CO1

UNIT – II

4. (a) What is meant by desalination? Explain desalination of brackish water by reverse osmosis method. (7M) CO2
   (b) What are the specifications of potable water according to WHO guidelines? (7M) CO2

(OR)

5. (a) Define electroplating and write the conditions required for Cu electroplating. (7M) CO2
   (b) Illustrate galvanic corrosion with examples. (7M) CO2

UNIT – III

6. (a) Write the synthesis and pharmaceutical applications of Aspirin. (7M) CO3
   (b) Differentiate between mechanisms of SN^1 and SN^2 reactions. (7M) CO3

(OR)

7. (a) Define conducting polymer and explain their general applications. (7M) CO3
   (b) What is meant by glass transition temperature (Tg) and discuss the factors affecting glass transition temperature. (7M) CO3

UNIT – IV

8. (a) State Beer-Lambert's law and explain Bathochromic and Hypsochromic shifts with examples (7M) CO4
   (b) Discuss the principle and procedure involved in estimation of Iron (III) by Colorimetric method. (7M) CO4

(OR)

9. (a) Summarize the principle, conditions for IR activity and applications of IR spectroscopy. (7M) CO4
   (b) What is the principle of fluorescence spectroscopy and discuss its applications in medicine. (7M) CO4

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Hall Ticket Number:

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CE/EE/ME112(R20)

B.TECH. DEGREE EXAMINATION, OCTOBER-2021

Semester I [First Year] (Supplementary)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Define crystal field splitting energy. CO1
   (b) What are advantages of fuel cell? CO1
   (c) Name active materials of lead acid battery. CO1
   (d) Distinguish primary battery from secondary battery CO2
   (e) Explain how an exhausted cation exchange resin can be regenerated? CO2
   (f) What is sedimentation? CO2
   (g) What is electro plating? CO3
   (h) Where do we observe galvanic corrosion? CO3
   (i) What is Anti Markownikoffs rule? CO3
   (j) Outline the significance of glass transition temperature. CO4
   (k) Explain the degree of dissociation with example. CO4
   (l) Explain Beer-Lambert's Law. CO4
   (m) Organise the various electronic transitions in the order of increasing energy. CO4
   (n) Mention the detector used in UV-Visible spectrophotometer. CO4

UNIT – I

2. (a) Illustrate crystal field spitting of d orbitals in tetrahedral geometry. (7M) CO1
   (b) Describe Andrews isotherms of Carbon dioxide. (7M) CO1

(OR)

3. (a) Derive Nernst equation for electrode potential. (7M) CO1
   (b) Describe construction and working of Lithium ion battery with neat diagram (7M) CO1

UNIT – II

4. (a) Discuss the municipal water treatment in detail. (8M) CO2
   (b) Describe desalination of water by reverse osmosis method. What are its advantages? (6M) CO2

(OR)

5. (a) Discuss the mechanism electrochemical corrosion with necessary reactions. (7M) CO2
   (b) Explain cathodic protection method to control the corrosion. (7M) CO2

UNIT – III

6. (a) Discuss the mechanism of Diel's Alder reaction with two examples. (7M) CO3
   (b) Discuss the mechanism of elimination reactions with suitable examples. (7M) CO3

(OR)

7. (a) Analyse the relationship between structure and properties of a polymer. (6M) CO3
   (b) Identify the reason for conductivity of polyacetylene by writing the mechanism of conduction. (8M) CO3

UNIT – IV

8. (a) Illustrate components and working of UV spectrophotometer with neat block diagram. (8M) CO4
   (b) Classify electronic transitions and write about blue shift and red shift with examples. (6M) CO4

(OR)

9. (a) Explain fluorescence and write its applications in medicine. (7M) CO4
   (b) Outline the condition for a molecule to be IR active. Classify types of vibration modes of polyatomic molecules. (7M) CO4

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Hall Ticket Number:

file-2

CE/EE/ME112(R20)

B.TECH. DEGREE EXAMINATION, JULY-2021

Semester I [First Year] (Regular)

ENGINEERING CHEMISTRY

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Define CFSE. CO1
   (b) Define critical temperature. CO1
   (c) Distinguish primary battery from secondary battery. CO1
   (d) Name active materials of dry battery. CO1
   (e) Explain how an exhausted ion exchange resins can be regenerated? CO2
   (f) What is coagulation? CO2
   (g) What is electroless plating? CO2
   (h) Explain the effect of pH on rate of corrosion. CO2
   (i) What is Markownikoffs rule? CO3
   (j) Outline the significance of glass transition temperature. CO3
   (k) Write the functionality of ethylene. CO3
   (l) Write mathematical expression of Beer-Lambert's Law. CO4
   (m) Organise the various electronic transitions in the order of increasing energy. CO4
   (n) Define fluorescence. CO4

UNIT – I

2. (a) Illustrate crystal field spitting of d-orbitals in octahedral geometry. (7M) CO1
   (b) Make use of Vander waal's equation, derive critical constants. (7M) CO1

(OR)

3. (a) Derive Nernst equation for electrode potential and list the factors affecting electrode potential. (7M) CO1
   (b) Describe construction and working of H_2-O_2 fuel cell with neat diagram. (7M) CO1

UNIT – II

4. (a) Explain breakpoint chlorination. What is its significance in water treatment? (7M) CO2
   (b) Describe desalination of water by reverse osmosis method. What are its advantages? (7M) CO2

(OR)

5. (a) Discuss the mechanism of rusting of iron by electrochemical corrosion with necessary reactions. (7M) CO2
   (b) Explain sacrificial anodic method to control the corrosion. (7M) CO2

UNIT – III

6. (a) Discuss the mechanism of Diel's Alder reaction with two examples. (7M) CO3
   (b) Compare the mechanism of SN^1 and SN^2 reactions with suitable examples. (7M) CO3

(OR)

7. (a) Distinguish addition polymerisation from condensation polymerisation. (6M) CO3
   (b) Analyse the reason for conductivity of polyacetylene with necessary chemical reactions. Write any two applications of conducting polymers. (8M) CO3

UNIT – IV

8. (a) Explain how amount of ferric iron is determined by Colourimetry. (8M) CO4
   (b) Distinguish conjugate and non conjugate diene using electronic spectroscopy. (6M) CO4

(OR)

9. (a) Illustrate components and working of IR spectrophotometer with neat block diagram. (8M) CO4
   (b) Mention the condition for a molecule to be IR active. Explain various vibration modes of CO_2 and H_2O molecules. (6M) CO4

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