

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Title	ENGIN	NEER	ING CHEMIST	RY		
Course Code	AHSB	AHSB03				
Programme	B.Tech	B.Tech				
S	Ι	CSE	E IT EEE			
Semester	II	AE	ECE ME CE			
Course Type	Founda	Foundation				
Regulation	IARE	- R18	;			
			Theory		Practic	cal
Course Structure	Lectu	ires	Theory Tutorials	Credits	Practic Laboratory	cal Credits
Course Structure	Lectu 3	ires	Theory Tutorials 1	Credits 4	Practic Laboratory 3	Credits
Course Structure Chief Coordinator	Lectu 3 Dr. V A	ires Anitha	Theory Tutorials 1 Rani, Professor	Credits 4	Practic Laboratory 3	cal Credits 1.5

COURSE OBJECTIVES:

The cou	rse should enable the students to:
Ι	Apply the electrochemical principles in batteries, understand the fundamentals of corrosion.
II	Analysis of water for its various parameters and its significance in industrial and domestic applications.
III	Analyze microscopic chemistry in terms of atomic, molecular orbital's and Intermolecular forces.
IV	Analysis of major chemical reactions that are used in the synthesis of molecules.
V	Understand the chemistry of various fuels and their combustion.

COURSE OUTCOMES (COs):

CO 1	Understand the relationship between charge delivered or produced and the amount of reactant used or product formed for both galvanic and electrolytic cells.
CO 2	Ability to describe the purpose and operational steps of water treatment processes used to improve water quality.
CO 3	Recognize that molecular orbital theory is a method used by chemists to determine the energy of the electron in a molecule as well as its geometry.
CO 4	Identify the fundamental principles of stereochemistry, chemical bonding, chemical reactions and mechanism.
CO 5	Understand and analyze the combustion mechanisms of various fuels.

COURSE LEARNING OUTCOMES (CLOs):

AHSB03.01	Extrapolate the knowledge of electrolytic cell, electrochemical cell, electrode Potential and reference electrodes.
AHSB03.02	Use of primary and secondary batteries in various fields such as automobiles, railways, medical devices, aircrafts and day to day life.
AHSB03.03	Explain the characteristic factors of a metal and environment influencing the rate of Corrosion.
AHSB03.04	Use appropriate methods such as protective, metallic and organic coatings to Control corrosion in metals.
AHSB03.05	Evaluate the quality and utility of suitable water for industrial as well as domestic applications.
AHSB03.06	Use innovative methods to improve the quality of soft water for Potable and industrial purpose at cheaper cost.
AHSB03.07	Understand the basic tenets of molecular orbital theories.
AHSB03.08	Understand the different approaches to types of chemical bonding.
AHSB03.09	Recognize and draw structural isomers, stereoisomerism including enantiomers and diastereomers and racemic mixture.
AHSB03.10	Understand the mechanisms of major classes of organic reactions, including substitutions, eliminations and addition.
AHSB03.11	Retrieve and critically review information on drugs, including how to synthesize them, from literature resources.
AHSB03.12	Demonstrate comprehensive knowledge of conventional fuel properties on engine performance.
AHSB03.13	Understand the importance of cracking, knocking in IC engines and operations involved in petroleum refining.
AHSB03.14	Describe the physical and chemical properties of fuels like natural gas, LPG and CNG.
AHSB03.15	Determine efficiency of the fuel in terms of calorific value and combustion reactions of the fuel.

TUTORIAL QUESTION BANK

	MODULE- I			
	ELECTROCHEMISTRY AND BATTERIES			
C N.	Part - A (Snort Answer Questions)	Diaman	C	C
S NO	QUESTIONS	Blooms Taxonomy Level	Outcomes	Learning Outcomes
1	What are conductors? Differentiate metallic conductors from electrolytic	Understand	CO 1	AHSB03.01
2	What is single electrode potential? How do you determine the electrode potential of $Zn/ZnSQ_2$?	Remember	CO 1	AHSB03.01
3	What is the role of the salt bridge in the voltaic cell?	Understand	CO 1	AHSB03.01
4	What is EMF of a galvanic cell? How to represent a galvanic cell.	Remember	CO 1	AHSB03.01
5	Define electrochemical series and write its applications?	Remember	CO 1	AHSB03.01
6	Write Nernst equation for the calculation of electrode potential.	Understand	CO 1	AHSB03.01
7	Write the advantages and limitations of quinhydrone electrode.	Understand	CO 1	AHSB03.01
8	Define batteries. How are they classified?	Remember	CO 1	AHSB03.02
9	Differentiate between Primary and Secondary cells with suitable examples.	Understand	CO 1	AHSB03.02
10	Write the discharging and charging reactions of a lead acid battery.	Understand	CO 1	AHSB03.02
11	Define corrosion of metals. Write any two causes and disadvantages of corrosion.	Remember	CO 1	AHSB03.03
12	What is pilling-bedworth rule?	Remember	CO 1	AHSB03.03
13	How corrosion takes place by different gases? Give examples.	Understand	CO 1	AHSB03.03
14	Differentiate between dry corrosion and wet corrosion.	Understand	CO 1	AHSB03.03
15	What is pitting corrosion? Give two examples.	Remember	CO 1	AHSB03.03
16	What is cathodic protection? Explain sacrificial anodic protection method.	Remember	CO 1	AHSB03.04
17	What is hot dipping? Give the importance of tinning in corrosion control.	Remember	CO 1	AHSB03.04
18	Impure metal corrodes faster than pure metal under identical conditions. Why?	Understand	CO 1	AHSB03.03
19	What is cementation of metal?	Remember	CO 1	AHSB03.04
20	What is galvanic corrosion? Give two examples.	Remember	CO 1	AHSB03.04
	Part - B (Long Answer Questions)			
1	What is Galvanic cell? Explain the construction of Galvanic cell with electrode reactions.	Understand	CO 1	AHSB03.01
2	Derive Nernst equation. Explain how it can be utilized to find the emf of an electrolyte concentration cell?	Understand	CO 1	AHSB03.01
3	Explain about Electrochemical series with its applications.	Remember	CO 1	AHSB03.01
4	Explain the construction of calomel electrode. How the potential of calomel electrode vary with concentration of KCl?	Understand	CO 1	AHSB03.01
5	What are reference electrodes? Explain the construction of Quinhydrone electrode?	Understand	CO 1	AHSB03.01
6	Differentiate between primary and secondary cells. Describe the construction and working of glass electrode with a neat diagram.	Understand	CO 1	AHSB03.01
7	What is battery? Explain about the construction and discharging reactions of dry cell.	Understand	CO 1	AHSB03.02
8	Explain the construction and working of lead-acid battery. Write the discharging, charging reactions and limitations of lead acid battery?	Understand	CO 1	AHSB03.02
9	Describe the construction of Lithium ion battery with relevant reactions. Mention its applications.	Understand	CO 1	AHSB03.02
10	What is oxidation corrosion and how does it takes place? Describe the mechanism of oxidation corrosion?	Understand	CO 1	AHSB03.03
11	Describe the mechanism of hydrogen evolution type corrosion and oxygen absorption type corrosion with a neat diagram.	Understand	CO 1	AHSB03.03
12	Explain about Galvanic corrosion and pitting corrosion with a neat diagram.	Understand	CO 1	AHSB03.03
13	Discuss how nature of metal influences the rate of corrosion in metals?	Understand	CO 1	AHSB03.03

14	Explain how nature of corroding environment influences the rate of corrosion in	Understand	CO 1	AHSB03.03
1.5	metals?	TT 1 1	00.1	
15	Describe the process of galvanization. How does it prevent the corrosion of iron	Understand	COT	AHSB03.04
16	and mention its applications.	Understand	CO 1	AUGD02 04
10	Explain the process of thinning. How does it prevent the corrosion of from and mention its applications	Understand	01	АПЗВ03.04
17	What is cathodic protection? Explain sacrificial anodic protection method of	Understand	CO 1	AHSB03.04
17	controlling corrosion.	Chaelstand	001	1115205.01
18	Write in brief on impressed current cathodic protection method of controlling	Understand	CO 1	AHSB03.04
_	corrosion with a neat diagram.			
19	Describe the process of electroplating of copper and write the advantages of	Understand	CO 1	AHSB03.04
20	Describe the process of electroless plating of copper and write the advantages of	Understand	CO 1	AHSB03.04
20	Electroless nlating	Onderstand	001	AIISD05.04
	Part - C (Problem Solving and Critical Thinking O	lestions)		
1	Calculate the e.m.f of voltaic cell Fe $ $ Fe $^{2+}(ag) $ Cu $^{2+}(ag) $ Cu. Given the	Understand	CO 1	AHSB03.01
	Electrode potentials of copper and iron are 0.34 volt and -0.44 volt			
	respectively.			
2	Calculate the EMF of a cell if the reduction potentials of the cell are -0.763V	Understand	CO 1	AHSB03.01
	and 0.337V.			
3	Calculate the electrode potential of the copper wire dipped in 0.1 M CuSO ₄ solution at 25° c The standard electrode potential of copper is 0.34 V	Understand	CO 1	AHSB03.01
4	The standard reduction potentials of Zn^{+2}/Zn and Cu^{+2}/Cu are -0.76V	Understand	CO 1	AHSB03.01
	and +0.34 V respectively. What is the e.m.f of the cell? $Zn(s)/Zn^{+2}$ (0.05M)	Onderstand	001	1115205.01
	$//Cu^{+2}(0.005M) Cu(s)$			
5	Write the overall call reaction for $\frac{7n(c)}{7n^{2+}}(0.2M)/(4 g^{+}(0.002 M)/4 g(s))$ and	Understand	CO 1	AUSB03.01
5	Calculate the emf of the cell at 25° C The standard emf of the cell is 1.54 V	Understand	01	Alisbus.01
6	Why does corrosion of water filled steel tanks occur below the waterline?	Understand	CO 1	AHSB03.03
7	Galvanized container is not used for storage of food products, but tin coated	Understand	CO 1	AHSB03.04
,	container is used. Comment on the statement.	Chiefstune	001	1115205101
8	How is cathodic protection of iron different from its galvanization?	Understand	CO 1	AHSB03.04
9	Why does a steel pipe in a large copper tank corrode and causing rapid	Understand	CO 1	AHSB03.03
	destruction?			
10	Iron does not rust if the zinc coating is broken in a galvanized iron pipe, but	Understand	CO 1	AHSB03.04
	rusting occurs much faster if the fin coating over iron is broken.			
	MODULE II			
	WATER AND ITS TREATMENT			
	Part – A (Short Answer Questions)			
1	What is hard water? Give the disadvantages of hard water in domestic	Remember	CO 2	AHSB03.05
-	requirements.		001	1110200100
2	Differentiate between temporary and permanent hardness of water.	Understand	CO 2	AHSB03.05
3	What is the basic principle involved in estimation of hardness of water by	Remember	CO 2	AHSB03.06
	EDTA method?			
4	Discuss internal treatment of hard water.	Understand	CO 2	AHSB03.06
5	What is colloidal conditioning?	Understand	CO 2	AHSB03.06
6	Describe the causes and harmful effects of hard water.	Understand	CO 2	AHSB03.05
7	Distinguish between soft water and hard water.	Understand	CO 2	AHSB03.05
8	what is soft water gives the examples of any two soft water sources.	Remember	CO 2	AHSB03.05
9	What is conditioning of water in bollers?	Remember	CO 2	AHSB03.06
10	what are the saits responsible for the temporary and permanent hardness of water?	Kennennber		AII3003.03
11	What is meant by softening of water?	Remember	CO 2	AHSB03.06
12	How permanent hardness is removed from hard water?	Understand	CO 2	AHSB03.05
13	How is natural water sterilized by bleaching powder?	Understand	CO 2	AHSB03.06
14	Discuss break point of chlorination in treatment of potable water.	Understand	CO 2	AHSB03.06
15	Write about calgon conditioning in internal treatment of boiler feed water.	Understand	CO 2	AHSB03.06
16	What is screening of potable water?	Remember	CO 2	AHSB03.06
17	What are the advantages of reverse osmosis?	Understand	CO 2	AHSB03.06

18	Write the advantages and disadvantages of ion exchange process.	Understand	CO 2	AHSB03.06
19	What is sedimentation?	Remember	CO 2	AHSB03.06
20	What is potable water? Write the specifications of potable water.	Remember	CO 2	AHSB03.06
	Part - B (Long Answer Questions)			
1	Explain the following:	Understand	CO 2	AHSB03.05
	i. Why do we express hardness of water in terms of CaCO ₃ equivalent?			
	ii. Why hard water fails to produce lather with soap solution?			
	iii Distinguish between Hard water and Soft water?			
2	Write the experimental procedure for the determination of total hardness by	Understand	CO 2	AHSB03.06
2	EDIA method.	I In denote a d	CO 2	
3	i Temperary bardness	Understand	02	AHSB05.05
	i. Temporary hardness			
4	What are the different units in which the hardness of water is expressed?	Remember	CO 2	AHSB03.05
5	Explain the process of chlorination of potable water	Understand	$\frac{\text{CO } 2}{\text{CO } 2}$	AHSB03.06
6	What are requisites of drinking water? Explain about coagulation and filtration	Understand	CO 2	AHSB03.06
Ũ	in treatment method of potable water.	Onderstand	002	1115205.00
7	List the salts responsible for temporary hardness and permanent	Understand	CO 2	AHSB03.05
	hardness. Mention the disadvantages of using hard water for domestic and			
	industrial purpose.			
8	How is natural water sterilized by chlorine, bleaching powder, chloramines?	Understand	CO 2	AHSB03.06
9	Briefly describe disinfectation of municipal water?	Understand	CO 2	AHSB03.06
10	Describe Ion-Exchange method of demineralization of water. Mention the	Understand	CO 2	AHSB03.06
	Advantages Ion-Exchange method.			
11	What is meant by sterilization of water? Explain how sterilization of water is	Understand	CO 2	AHSB03.06
	Carried by chlorination and ozonization.			
12	Explain the reverse osmosis process with a neat labeled diagram. Mention its	Understand	CO 2	AHSB03.06
	advantages.		~~ •	
13	Explain the following internal treatment methods:	Understand	CO 2	AHSB03.06
	i. Colloidal conditioning			
	11. Calgon conditioning			
14	Compare the temporary and permanent hardness of water	Understand	CO 2	AUSP03.05
14	How do you estimate the temporary and permanent hardness of water by	Understand	$\frac{CO2}{CO2}$	AHSB03.05
15	complexometric method?	Onderstand	02	AIISD05.00
16	What is hardness of water due to? What are its units? How are they related?	Understand	CO 2	AHSB03.05
17	What is desalination? Explain any one of the method available for desalination.	Understand	CO 2	AHSB03.06
18	How boiler feed water treated with internal treatment give the various chemical	Understand	CO 2	AHSB03.06
10	reactions?	Charlstand	001	11115200100
19	Discuss the basic principles involved in the estimation of hardness of water by	Understand	CO 2	AHSB03.06
-	EDTA method.		-	
20	Write a brief account on break point of chlorination.	Understand	CO 2	AHSB03.06
	Part - C (Problem Solving and Critical Thinking Q	uestions)		·
1	Why do we add buffer solution during estimation of hardness of water by	Understand	CO 2	AHSB03.05
	EDTA method?			
2	What happens when temporary hard water is boiled? Give reactions.	Understand	CO 2	AHSB03.05
3	Calgon treatment prevents scale formation in boilers. Why?	Understand	CO 2	AHSB03.06
4	One liter of water sample collected from a water source in Telangana has	Understand	CO 2	AHSB03.06
	shown the Following analysis. Mg (HCO ₃) =14.6 mg, MgSO ₄ =12 mg,Ca			
	$(HCO_3)_2=16.2 \text{ mg}, CaCl_2=22.2 \text{ mg}, MgCl_2=9.5 \text{ mg} \text{ and organic impurities}$			
	100 mg. Calculate temporary and permanent hardness in Degree French.	XX 1	00.0	
5	One liter of water from an underground reservoir in Tirupathi Town in Andhra	Understand	CO 2	AHSB03.06
	Pradesn showed the following analysis for its contents: $Mg(HCO_3)_2=42$ mg;			
	$Ca(HCO_3)_2=140$ mg; $CaCl_2=/1$ mg; MgSO ₄ =48 mg; Calculate temporary,			
6	A sample of hard water contains the following dissolved calts per liter.	Understand	CO 2	AUSB02 06
0	A sample of hard water contains the following dissolved saits per filter. Mg $(HCO_{2})_{2}$ = 14 fmgs: $C_{2}(HCO_{2})_{2}$ = 16 2mgs: $C_{2}C_{1}$ = 111mgs: $C_{2}SO_{2}$ = 1.36mgs:	Understand	02	AIISD05.00
	silica=40 mgs. Turbidity=10 mgs. Calculate the temporary nermanent			
	and total hardness of water in ppm, degree Clark and degree French.			

7	Calculate temporary and permanent hardness of a water sample which	Understand	CO_2	AHSB03.06
,	contains 6 8mg of CoSO 33mg of CoCl 40mg of MgCl 24mg of	Onderstand	002	AIISD05.00
	contains 0.8mg of CaSO ₄ , SSing of CaCl ₂ , 40mg of M_2 Cl ₂ ,24mg of M_2 Cl ₂ ,24mg of M_2 Cl ₂ ,24mg of			
	$MgSO_4$ per liter of the water sample. (Given Molar mass of			
	Ca=40g,Mg=24g,S=32g,O=16g,Cl=35g).			
8	A sample water of 100 ml required 12.6 ml of 0.02M EDTA solution with	Understand	CO 2	AHSB03.06
	EBT as indicator and 8.4 ml of 0.02 M EDTA for the same volume of water			
	after removing the carbonate hardness. Calculate the total, permanent			
	hardness in terms of calcium carbonate equivalents.			
9	A sample water of 20 ml required 18.2 ml of 0.01M EDTA solution with	Understand	CO 2	AHSB03.06
	EBT as indicator and 4.6 ml of 0.01 M EDTA for the same volume of water			
	after removing the carbonate hardness Calculate the total permanent			
	hardness in terms of calcium carbonate equivalents			
10	A sample water of 20 ml required 18.2 ml of 0.01M EDTA solution with	Understand	CO 2	AHSB03.06
10	EDT as indicator and 4.6 ml of 0.01 M EDTA for the same volume of water	Understand	02	Alisb05.00
	EDT as indicator and 4.0 mi of 0.01 M EDTA for the same volume of water			
	after removing the carbonate nardness. Calculate the total, permanent			
	hardness in terms of calcium carbonate equivalents.			
	MODULE -III			
	MOLECULAR STRUCTURE AND THEORIES OF	BONDING		
	Part - A (Short Answer Questions)			-
1	Define atom?	Remember	CO 3	AHSB03.07
2	What are atomic orbitals? Draw the shapes of atomic orbitals?	Remember	CO 3	AHSB03.07
3	Write the molecular orbital electronic configuration of N_2 molecule?	Remember	CO 3	AHSB03.08
4	Define the term hand order and how is it calculated?	Remember	<u> </u>	AHSB03.08
-	Write the molecular orbital electronic configuration of O molecula?	Remember	<u> </u>	AUSD03.00
3	while the molecular orbital electronic configuration of O_2 molecule?	Kemember	<u> </u>	AHSD03.07
6	Calculate the number of bonding and anti bonding molecular orbital's in CO	Understand	003	AHSB03.07
	and NO molecule?			
7	Calculate the bond order of O ₂ molecule?	Understand	CO 3	AHSB03.08
8	Write a short note on LCAO?	Understand	CO 3	AHSB03.07
9	Define bonding, anti bonding molecular orbitals? Calculate the bond order of	Remember	CO 3	AHSB03.07
	F_2 molecule?			
10	Calculate the bond order of N ₂ molecule?	Understand	CO 3	AHSB03.08
10	Calculate the bond order of N ₂ molecule?	Understand	CO 3	AHSB03.08
10 11	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry?	Understand Understand	CO 3	AHSB03.08 AHSB03.08
10 11 12	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field?	Understand Understand Understand	CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08
10 11 12 13	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two selient features for CET?	Understand Understand Understand	CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
10 11 12 13	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the enlitting of the degenerate d orbital's due to genera planar ligand	Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
10 11 12 13 14	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand Field?	Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07
10 11 12 13 14	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to square planar ligand	Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07
10 11 12 13 14 15	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field?	Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07
10 11 12 13 14 15 16	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory?	Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.07
10 11 12 13 14 15 16 17	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids?	Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.07
10 11 12 13 14 15 16 17 18	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced?	Understand Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08
10 11 12 13 14 15 16 17 18 19	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced?	Understand Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08
10 11 12 13 14 15 16 17 18 19 20	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types?	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
10 11 12 13 14 15 16 17 18 19 20	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types?	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 1 \end{array} $	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of	Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
10 11 12 13 14 15 16 17 18 19 20 1	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N2 and E-2	Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 1 \\ 20 \\ 1 \end{array} $	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N2 and F2? Calculate sumbage of heardings and aptic heardings orbital's in O	Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 1 \\ 2 \end{array} $	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N2 and F2? Calculate number of bonding and anti-bonding orbital's in O2, N2, F2, CO & NO melegulas?	Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Remember	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 1\\ 2\\ 2\\ 1\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\$	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N2 and F2? Calculate number of bonding and anti-bonding orbital's in O2, N2, F2, CO & NO molecules?	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand	CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ \hline 1 \\ 2 \\ 3 \end{array} $	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N2 and F2? Calculate number of bonding and anti-bonding orbital's in O2, N2, F2, CO & NO molecules? Explain the bond order and magnetic property in the following molecules	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 1 \\ 2 \\ 3 \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO?	Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Remember	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ \hline 1 \\ 2 \\ 3 \\ 4 \\ \end{array} $	Calculate the bond order of N2 molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Explain with the neat diagrams the molecular energy level diagrams of following molecules N2 and F2? Calculate number of bonding and anti-bonding orbital's in O2, N2, F2, CO & NO molecules? Explain the bond order and magnetic property in the following molecules N2, O2, F2, CO & NO? Explain with the neat diagram molecular energy level diagrams of	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 1 \\ 2 \\ 3 \\ 4 \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO?	Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 1\\ 20\\ 1\\ 3\\ 4\\ 5\\ \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write the splitting of the degenerate d-orbital's due to octahedral field? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 1\\ 20\\ 1\\ 3\\ 4\\ 5\\ \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂ molecule with the neat diagram?	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08
$ \begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 1\\ 20\\ 1\\ 3\\ 4\\ 5\\ 6\\ 6\\ \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂ molecule with the neat diagram? Define the following terms.	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand	$ \begin{array}{c} \text{CO 3} \\ \text{CO 3} $	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂ molecule with the neat diagram? Define the following terms. Bond order	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 1\\ 20\\ 1\\ 20\\ 1\\ 5\\ 6\\ 6\\ 6\\ 17\\ 18\\ 19\\ 20\\ 1\\ 1\\ 20\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 2\\ 1\\ 1\\ 2\\ 2\\ 1\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\$	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is p-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂ molecule with the neat diagram? Define the following terms. i. Bond order Bonding molecule orbital	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{r} 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ \hline 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{array} $	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is n-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂ molecule with the neat diagram? Define the following terms. i. Bond order ii. Bonding molecule orbital iii. Anti-bonding molecule orbital	Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand Understand	CO 3 CO 3	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08
$ \begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 1\\ 20\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\$	Calculate the bond order of N ₂ molecule? Write a short note on crystal field splitting of octahedral geometry? How to calculate crystal field splitting energy for tetrahedral field? Write any two salient features for CFT? Write the splitting of the degenerate d-orbital's due to square planar ligand field? Write the splitting of the degenerate d-orbital's due to octahedral field? What are eg, t2g orbital's in crystal field theory? Write a short note on band structure of solids? How is n-type semiconductors produced? How is n-type semiconductors produced? Define doping? Write its types? Part – B (Long Answer Questions) Explain with the neat diagrams the molecular energy level diagrams of following molecules N ₂ and F ₂ ? Calculate number of bonding and anti-bonding orbital's in O ₂ , N ₂ , F ₂ , CO & NO molecules? Explain the bond order and magnetic property in the following molecules N ₂ , O ₂ , F ₂ , CO & NO? Explain with the neat diagram molecular energy level diagrams of hetero diatomic molecules CO and NO? Write a short note on LCAO? Explain molecular energy level diagrams for F ₂ molecule with the neat diagram? Define the following terms. i. Bond order ii. Bond order Explain molecule orbital Explain the bonding molecule orbital Explain the shores of atomic orbital	Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand	$ \begin{array}{c} \text{CO 3} \\ \text{CO 4} \\ \text{CO 3} $	AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.07 AHSB03.07 AHSB03.07 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08 AHSB03.08

8	Explain molecular orbital theory? Draw the energy level diagram for one hetero molecule, one homo molecule?	Understand	CO 3	AHSB03.08
9	Explain molecular energy level diagrams for O_2 and N_2 molecule with the neat diagram?	Understand	CO 3	AHSB03.08
10	Explain molecular energy level diagrams for CO and NO molecule with the	Understand	CO 3	AHSB03.08
	neat diagram?			
		1		
11	Give an account of the splitting of the degenerate d-orbital's in square planar?	Understand	CO 3	AHSB03.07
12	How crystal field splitting takes place in octahedral?	Understand	CO 3	AHSB03.08
13	Give the splitting of the degenerate d-orbitals of tetrahedral?	Understand	CO 3	AHSB03.07
14	Write a brief account on the following:	Understand	CO 3	AHSB03.08
	i. crystal field theory and magnetic properties of metal complexesii strong and weak field ligands			
15	How crystal field splitting takes place in tetrahedral complexes?	Understand	CO 3	AHSB03.08
16	With the help of suitable illustrations explain the crystal field splitting of	Understand	CO 3	AHSB03.08
17	Octanedral geometry?	Lindonston d	CO 2	
17	Explain the band structure of solids by taking Li as an example?	Understand	CO 3	AHSD03.08
10	Explain about intrinsic and avtrinsic somiconductors?	Understand	CO_3	AUSB03.08
20	Write short notes on p-type and p-type semiconductors?	Understand	CO 3	AHSB03.08
20	$\frac{1}{1}$ write short holes on p-type and n-type semiconductors: Part = C (Problem Solving and Critical Think)	ing)	05	AU3D03.00
1	Write the MO electronic configuration of a diatomic molecule (homo hetero)	Understand	CO 3	AHSB03.08
1	having a bond order of three?	Onderstand	005	AIISD05.00
2	Draw the molecular orbital energy level diagram of Ω_2 and find out the bond	Understand	CO 3	AHSB03.07
_	order and its magnetic behaviour?	Chacistana	005	THISD03.07
3	Give the reasons for the following.	Remember	CO 3	AHSB03.08
	i. O_2 is paramagnetic			
	ii. N_2 is diamagnetic			
	iii. CO is diamagnetic			
	iv NO is paramagnetic		~~ •	
4	What is meant by bond order? How it is related to MOT energy level diagrams?	Understand	CO 3	AHSB03.07
5	Why O ₂ and NO have same magnetic property explains with electronic	Understand	CO 3	AHSB03.08
	configuration?			
0.5		XX 1 1	<u> </u>	
06	Give the splitting of the degenerate d-orbital's of octahedral and tetrahedral?	Understand	CO 3	AHSB03.08
07	Give an account of the splitting of the degenerate d-orbital's in square planar and octahedral?	Understand	CO 3	AHSB03.08
08	How crystal field splitting takes place in square planar and tetrahedral?	Understand	CO 3	AHSB03.08
09	Explain the distribution of d-electrons in t2g and eg sets in both strong and	Understand	CO 3	AHSB03.08
	weak octahedral ligand fields?			
10	Write short notes on the following:	Understand	CO 3	AHSB03.08
	i. p-type semiconductors			
	ii. n-type semiconductors			
	MODULE -IV		LOL DOUB	a c
	STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHES	IS OF DRUG N	MOLECUL	ES
1	Part – A (Short Answer Questions) What is stores showing with a significance?	Domorahar	CO 4	
1	what is stereochemistry and its significance?	Remember	CO 4	AHSB03.09
2	What are constitutional isomers? Give examples	Remember	CO 4	AU2D03.03
3	What are conformational isomers?	Remember	CO 4	AHSB03.09
5	What are configurational isomers? Give examples	Remember	C04	AHSR03.09
6	Write any three characteristics of ontical isomers	Understand	C04	AHSB03.09
7	What are enantiomers? Give example	Remember	C04	AHSB03.09
8	What are diastereomers? Give example	Remember	CO 4	AHSB03.09
9	Which are called geometrical isomers?	Remember	CO 4	AHSB03.09
10	State Markovnikoff's rule with example	Understand	CO 4	AHSB03.09
11	Write the structure of aspirin.	Remember	CO 4	AHSB03.11
12	State Anti Markovnikoff's rule with example	Understand	CO 4	AHSB03 10

13	What are electrophiles? Give two examples.	Remember	CO 4	AHSB03.10
14	What are oxidation and reduction reactions?	Remember	CO 4	AHSB03.10
15	Define homolytic fission with example?.	Remember	CO 4	AHSB03.10
16	Define substitution reactions?	Remember	CO 4	AHSB03.10
17	What are addition reactions give one example?	Remember	CO 4	AHSB03.10
18	Define electrophilic addition reactions?	Remember	CO 4	AHSB03.10
19	Write any two factors affecting SN^1 mechanism?	Understand	CO 4	AHSB03 10
20	What are Grignard reagents? Give one example	Remember	CO 4	AHSB03.10
20	$\frac{Part - B (I ong Answer Ouestions)}{Part - B (I ong Answer Ouestions)}$	Remember	001	711151505.10
1	What is Markovnikoff's rule? Explain briefly with suitable example	Understand	CO 4	AHSB03 10
2	Explain the structure synthesis and applications of paracetamol	Understand		AHSB03.10
2	With the help of potential energy diagram, explain the conformational analysis	Understand	CO 4	AHSB03.00
5	of n-butane.	Understand	04	AIISD05.09
4	Explain the Grignard additions on carbonyl compounds with suitable examples?	Understand	CO 4	AHSB03.10
5	Explain the addition of HBr to propene and hydroboration of olefins?	Understand	CO 4	AHSB03.10
6	What are the enantiomers and their significance?	Remember	CO 4	AHSB03.09
7	Write the structure, synthesis and applications of Aspirin.	Understand	CO 4	AHSB03.11
8	Explain the sequence rule for assigning absolute configuration?	Remember	CO 4	AHSB03.09
9	What are the diastereomers and their significance?	Understand	CO 4	AHSB03.09
10	Explain nucleophilic substitution bimolecular mechanism with suitable examples.	Understand	CO 4	AHSB03.10
11	What is Saytzeff rule? Explain the saytzeff rule with suitable example.	Understand	CO 4	AHSB03.10
12	Define Electrophiles? Write a short note on electrophilic addition reactions.	Understand	CO 4	AHSB03.10
13	What are the important conditions for the existence of geometrical isomerism?	Understand	CO 4	AHSB03.09
14	Explain about E1 and E2 elimination reactions with suitable examples.	Understand	CO 4	AHSB03.10
15	What is nucleophilic substitution? Explain the mechanism, factors affecting and rate of SN ¹ mechanism.	Understand	CO 4	AHSB03.10
16	What is Anti-Markovnikoff's rule? Explain briefly with suitable example.	Understand	CO 4	AHSB03.10
17	Explain Nucleophilic substitution unimolecular mechanism with suitable	Understand	CO 4	AHSB03.10
18	Give a brief account on reduction reactions of carbonyl compounds using LiAlH ₄ , NaBH4.	Understand	CO 4	AHSB03.10
19	Give a brief account on oxidation reactions of alcohols using KMnO ₄ .	Understand	CO 4	AHSB03.10
20	What is nucleophilic substitution? Explain the mechanism, factors affecting and rate of SN^2 mechanism.	Understand	CO 4	AHSB03.10
	Part – C (Problem Solving and Critical Think	ing)		
1	How many types of addition reactions are there? Explain with suitable	Understand	CO 4	AHSB03.10
2.	The concentration of an optically active compound dissolved in chloroform is $6.15/100$ ml. A portion of this solution in a 5cm polarimeter tube produced an absorbed rotation of 1.2% Calculate the appealing rotation of the compound	Understand	CO 4	AHSB03.09
3	The concentration of an optically active compound dissolved in chloroform is $8.25/100$ ml. A portion of this solution in a 5cm polarimeter tube produced an observed rotation of -2.2° . Calculate the specific rotation of the compound.	Understand	CO 4	AHSB03.09
4	By selecting a suitable example explain the SN^1 mechanism.	Understand	CO 4	AHSB03.10
5	Explain the elimination reaction with suitable example?	Understand	CO 4	AHSB03.10
6	What are substitution reactions? Explain nucleophilic substitution SN ²	Understand	CO 4	AHSB03.10
7	How do you distinguish the following? i. Chiral carbon from achiral carbon			AHSB03.09
	11. Enantiomers from diastereomers	TT 1 · ·		
8	How addition reactions are different from elimination reactions?	Understand	CO 4	AHSB03.10
9	The concentration of an optically active compound dissolved in chloroform is 7.32/100ml A portion of this solution in a 5cm polarimeter tube produced an observed rotation of -2.4°.Calculate the specific rotation of the compound.	Understand	CO 4	AHSB03.09
10	By selecting a suitable example explain the SN ² mechanism.	Understand	CO 4	AHSB03.10

	MODULE -V			
	FUELS AND COMBUSTION			
- 1	Part - A (Short Answer Questions)	D 1	<u> </u>	4110000.10
1	What is fuel? Give the characteristics of a good fuel.	Remember	<u> </u>	AHSB03.12
2	Write the significance of moisture and volatile matter in coal.	Understand	<u> </u>	AHSB03.12
3	Mention three factors taken into consideration while selecting coal for different uses.	Understand	005	AHSB03.12
4	What is combustion? Write the combustion reactions for carbon and hydrogen.	Remember	CO 5	AHSB03.14
5	How sulphur is determined by ultimate analysis of a coal?	Understand	CO 5	AHSB03.13
6	What is meant by ignition temperature?	Remember	CO 5	AHSB03.14
7	What is cracking of petroleum? Give one suitable example for cracking process.	Remember	CO 5	AHSB03.13
8	Why gaseous fuels are more advantageous than solid fuels?	Understand	CO 5	AHSB03.12
9	Write the significance of fixed carbon and ash content in coal.	Understand	CO 5	AHSB03.12
10	What is CNG? Give the composition CNG.	Remember	CO 5	AHSB03.14
11	What are the various fractions obtained during refining of petroleum?	Understand	CO 5	AHSB03.13
12	Distinguish between gross and net calorific value of a fuel.	Understand	CO 5	AHSB03.15
13	Write n-octane, naphthalene and iso-octane in the increasing order of their knocking tendency.	Understand	CO 5	AHSB03.13
14	What is meant by calorific value of a fuel? Mention its units.	Remember	CO 5	AHSB03.15
15	What is LPG? Give its composition and applications	Remember	CO 5	AHSB03.14
16	Distinguish between octane number and cetane number.	Understand	CO 5	AHSB03.13
17	Write any one anti-knocking agent added to petrol and explain how it works.	Remember	CO 5	AHSB03.13
18	How sulphur compounds are eliminated from crude oil?	Understand	CO 5	AHSB03.13
19	Why it is necessary to remove sulphur from oil and natural gas?	Understand	CO 5	AHSB03.14
20	Define the term knocking of petroleum? Give one anti knocking agent for	Understand	CO 5	AHSB03.13
20	diesel knock.	enderstand	005	1110200.10
	Part - B (Long Answer Questions)			1
1	What are fuels? Give complete classification of fuels with suitable examples.	Remember	CO 5	AHSB03.12
2	Explain the proximate analysis of coal.	Understand	CO 5	AHSB03.12
_	i. Moisture			
	ii. Volatile matter			
	iii. Ash content			
	iv Fixed carbon.			
3	Define knocking. How it is related to octane number and gives the importance of TEL as an antiknocking agent?	Understand	CO 5	AHSB03.13
4	Explain how the percentage of carbon, hydrogen, sulphur and oxygen is	Understand	CO 5	AHSB03.12
•	estimated by ultimate analysis of coal.	Chadrotana	005	11115203.12
5	Explain the refining of petroleum by giving its composition boiling ranges and	Understand	CO 5	AHSB03 13
5	uses of various fractions obtained during refining.	Chaerbland	000	1110200.110
6	Explain the composition, properties and applications of LPG and CNG.	Understand	CO 5	AHSB03.14
7	Explain the ultimate analysis of coal.	Understand	CO 5	AHSB03.12
	i. Carbon and hydrogen ii. Nitrogen iii. Sulphur iv. Oxygen			
8	What is octane number and cetane number? Explain their significances.	Understand	CO 5	AHSB03.13
9	What is cracking? Explain about Fixed bed catalytic cracking with a neat	Understand	CO 5	AHSB03.13
10	diagram.	TT 1 / 1	<u> </u>	4110002.12
10	what is a crude oil? Write a short note on refining of petroleum with various	Understand	05	AHSB03.13
11	Tractions obtained during relining and mention uses of each fraction.	TTo 1 and a 1	CO 5	AUGD02 12
11	Discuss the advantages and disadvantages of sond, inquid and gaseous fuels.	Understand	<u> </u>	AHSB03.12
12	value(LCV) and explain the their relation between HCV and LCV.	Understand	003	АНЗВ05.15
13	What is a natural gas? Give the composition, properties and applications of natural gas.	Understand	CO 5	AHSB03.14
14	Differentiate the following	Remember	CO 5	AHSB03.14
	i. HCV and LCV			
	ii. CNG and LPG			
15	Explain the process of gasoline obtained from heavy oil?	Understand	CO 5	AHSB03.13
16	Explain how the percentage of Moisture .Volatile matter. Ash content and	Understand	CO 5	AHSB03.12
	Fixed carbon by proximate analysis of coal.			

17 Define octate fulliber of Gasonile. Why entyfelle diofonilde is added when Onderstand CO 5 AHSB03. 18 Define natural fuel and artificial fuel and write the characteristics of a good Understand CO 5 AHSB03. 18 Define natural fuel and artificial fuel and write the characteristics of a good Understand CO 5 AHSB03.
18 Define natural fuel and artificial fuel and write the characteristics of a good Understand CO 5 AHSB03. fuel. AHSB03 AHSB03 AHSB03 AHSB03
18 Define natural fuel and artificial fuel and write the characteristics of a good Understand CO 5 AHSB03. fuel.
fuel.
19 Explain the significances of proximate analysis and ultimate analysis? Understand CO 5 AHSB03.
20 What is cetane number? Explain their significances. Understand CO 5 AHSB03.
Part – C (Problem Solving and Critical Thinking)
1 List the various steps involved in refining of petroleum. At what temperature Understand CO 5 AHSB03.
kerosene, diesel and gasoline are obtained. How do they differ in their
composition?
2 How to improve the antiknock properties in petrol and diesel? Understand CO 5 AHSB03.
3 Gasoline containing TEL used in internal combustion engines. Why? Understand CO 5 AHSB03.
4 Why a good fuel should possess low oxygen and high carbon percentage? Understand CO 5 AHSB03.
5 Why is net calorific value less than gross calorific value? Understand CO 5 AHSB03.
6 A sample of coal contains Carbon=60%, Hydrogen=6%, Oxygen=33%, Understand CO 5 AHSB03.
Sulphur=0.5%, Nitrogen=0.2% and Ash=0.3%, Calculate the HCV
and NCV calorific values of the fuel
7 Calculate the gross and net calorific values of a coal sample having the Understand CO 5 AHSB03
following composition Carbon=20% Hydrogan=7% Oxygan=20%
Submup 2.50/ Nitro $\alpha_{2} = -7.0$ and $A_{2} = -7.0$, $O(A_{2} = -7.0)$
Supplut=5.5%, Nitrogen=2% and Asn=5%.
8 A sample of coal contains the following composition Carbon=84%, Understand CO 5 AHSB03.
Hydrogen=12%, Oxygen=2%, Sulphur =1% and the remainder being ash.
Calculate the gross and net calorific values of the fuel.
9 A sample of coal was found to have the following percentage composition: Understand CO 5 AHSB03.
C=75%, S=1.2%, H=5.2%, N=3.7%, O=12.8% and ash=2.1%. Oxygen in air
is 23% by weight. Calculate the minimum amount of air required for complete
combustion of 1kg of coal sample.
10 Calculate the minimum amount of air required for complete combustion of Understand CO 5 AHSB03.
1kg of coal sample having the following compositions: C=80%.
$S=2\%$ H=5% $\Omega = 3\%$ N=1% and ash=4% Ω xygen in air is 23% by weight

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