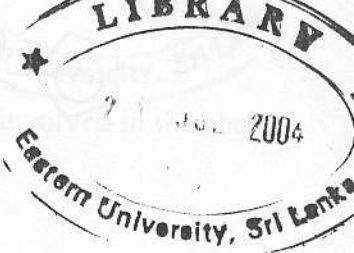


EASTERN UNIVERSITY SRI LANKA
DEPARTMENT OF CHEMISTRY
THIRD YEAR IN SCIENCE
SECOND SEMESTER – 2002/2003

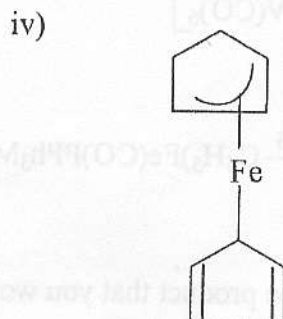
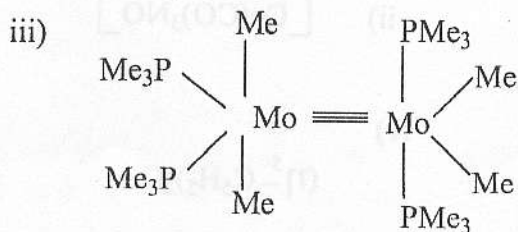
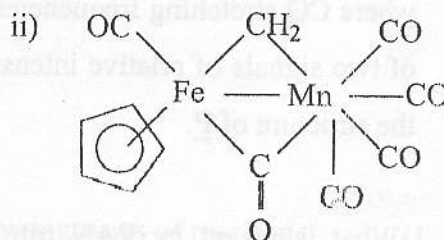
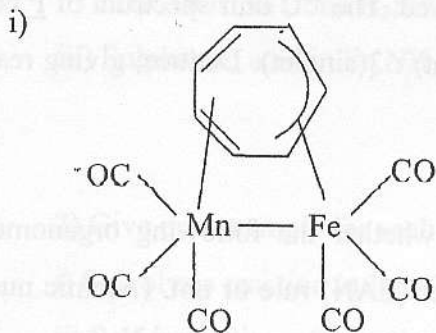


CH 305 ORGANOMETALLIC CHEMISTRY & NON-AQUEOUS SOLVENTS

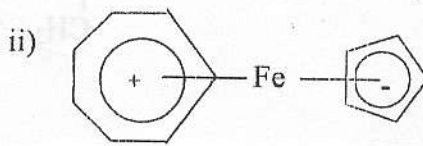
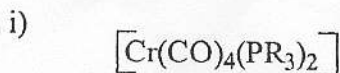
ANSWER ALL QUESTIONS

TIME – ONE HOUR

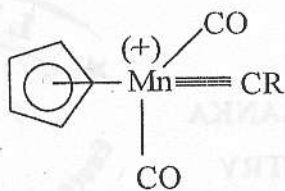
1) a) Indicate the monohapto, dihapto, trihapto, tetrahapto, pentahapto and bridging ligands present in the following compounds



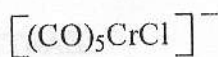
b) Give the systematic names of the following organometallic compounds.



iii)



iv)



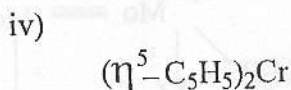
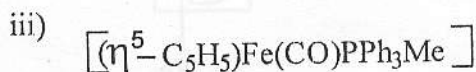
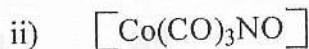
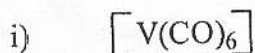
C) i) Arrange the following compounds in the order of increasing stretching frequency of the C-O bond.



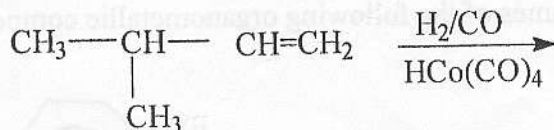
Account for your arrangement.

ii) A diamagnetic organometallic compound **P** having molecular formulae $\text{Co}_2(\text{CO})_8$ shows strong absorption at 2000 cm^{-1} and 1805 cm^{-1} in the region where CO stretching frequencies are observed. The ^{13}C nmr spectrum of **P** consist of two signals of relative intensity 1(singlet) : 3(singlet). Deduce, giving reasons, the structure of **P**.

2) a) 1) What is meant by EAN rule? Indicate whether the following organometallic compounds obey Effective Atomic Number (EAN) rule or not. (Atomic number: V = 23, Co = 27, Fe = 26, Cr = 24)



2) Give the product that you would expect from the hydroformylation reaction of



Give the mechanism and structures of all the compounds involved in the above catalytic cycle.

b) Explain the following with appropriate reasons

- i) Acetamide behaves as a weak base in aqueous solution but shows acidic property in liq. NH_3 .
- ii) Non-polar compounds are usually insoluble in strong polar solvents.

c) 1) Give balanced chemical equations for the following reactions.

- i) SiCl_4 in liq. NH_3 .
- ii) CH_3COOH in Conc. H_2SO_4 .
- iii) Sulphamic acid in liq. NH_3 .

2) Give one example for each of the following types of reaction.

- i) Solvolysis reaction in liq. NH_3 .
- ii) Self-ionization of a protic solvent.
- iii) Amphoteric reaction in liq. NH_3 .

Q3

(a) Consider a simple protocol for transferring files over a link. After an initial negotiation, **A** sends data packets of size 1 KB to **B**; **B** then replies with an acknowledgement. **A** always waits for each ACK before sending the next data packet; this is known as *stop-and-wait*. Packets that are overdue are presumed lost and are retransmitted.

(i). In the absence of any packet losses or duplication, explain why it is not necessary to include any *sequence number* data in the packet headers. {15}

(ii). Suppose that the link can lose occasional packets, but that packets that do arrive always arrive in the order sent. Is a 2-bit sequence number enough for **A** and **B** to detect and resend any lost packets? Is a 1-bit sequence number enough? {10}

(iii). Now suppose that the link can deliver out of order, and that sometimes a packet can be delivered as much as 1 minute after subsequent packets. How does this change the sequence number requirements? {15}

(b) Two neighbouring nodes (**A** and **B**) use a sliding-window protocol with a 3-bit sequence number. As the ARQ mechanism, Go-back-N is used with a window size of 4. Assuming **A** is transmitting and **B** is receiving, show the window positions for the following succession of events:

(i). Before **A** sends any frames. {20}

(ii). After **A** sends frames 0, 1, 2 and **B** acknowledges 0, 1 and the ACKs are received by **A**. {20}

(iii). After **A** sends frames 3, 4 and 5 and **B** acknowledges 4 and the ACK is received by **A**. {20}

Q4

(a) List the four main types of network topology currently in widespread use for LAN's and, with the aid of sketches, explain their operation. {40}

(b) Describe the principle of operation of the following LAN methods: {40}

(i) CSMA/CD

(ii) Token ring

(c) Briefly describe the Eastern University Campus Wide Area Network setup. {20}