

Indian Institute of Technology, Guwahati

Guwahati, INDIA 781 039

Date: 01 November 2017; 8:00-8.45 a.m.

CH-101

Name:

IBRAR

QUIZ 2

Signature of Invigilator:

Maximum Marks = 15

Roll No.: 170121020

111 Division: Tutorial Group:

Answer only in this sheet. Only fully correct answers will be accepted. All questions are compulsory. Rough work is mandatory

Given the wavefunction an electron in the 1s orbital of H-atom, $\Psi = \frac{1}{(\pi a_0^3)^{1/2}} e^{-r/a_0}$ and the radial probability density, $P(r) = 4\pi r^2 |\Psi|^2$, the most probable radius is: 2.5 Marks

+	$\frac{(z)}{2}a_0$	(Y) a_0	(X) $\frac{1}{2}a_0$	(W) $2a_0$			

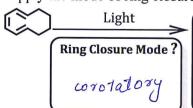
2. The two hybridized orbitals of C-atom (sp²) are $h_1 = (1/3)^{1/2} \{s - (3/2)^{1/2} p_x - (1/2)^{1/2} p_y\}$, and $h_2 = (1/3)^{1/2} p_y + (1/2)^{1/2} p_$ $(1/3)^{1/2}$ {s + $(3/2)^{1/2}$ p_x - $(1/2)^{1/2}$ p_y}. The expression for the third orbital (h₃) would be: 2.5 Marks

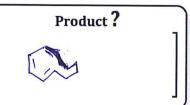
(H)	$(1/3)^{1/2} \{s + 2^{1/2}p_y\}$	(G)	$(1/3)^{1/2}$ {s - $(1/2)^{1/2}$ p _x - $(3/2)^{1/2}$ p _y
(E)	$(1/3)^{1/2} \{s - 2^{1/2}p_x\}$	(F)	$(1/3)^{1/2} \{s + (3/2)^{1/2}p_x + (1/2)^{1/2}p_y\}$

Identify the types of pericyclic reactions in each of the following steps and name the reaction; If it is a cycloaddition, give (x +y) designation and if it is sigmatropic, give the [i,j] designation. 2 Marks

Reaction step			Туре	Reaction step	Type
(a)	• • • •		[3+2]	(c) (c)	[7,7]
(b)	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	H ₂ C D D D D D	[1+2]	(d) H	[1, 3]

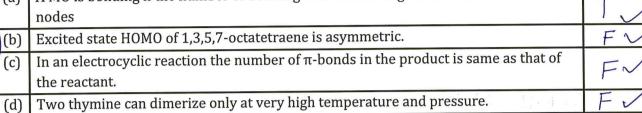
Supply the mode of ring closure, product and the reaction condition for the given transformation 1 Mark







5. Sta	ate which of the following statements are tue (T) and which are false (F)
(a)	A MO is bonding if the number of bonding interactions is greater than the number of



6. Indicate the number of valence electron on each metal complex.

(0.5 X 4) Marks

2 Marks T or F

	Me ₃ P _{***} CO Re CO PMe ₃		Cl OC Fe CO CO	P. Mo CO CO P P CO P CO P P C
Electron Count	4	,	2	2

7. Indicate if the following exhibit Strong (S), Weak (W) or No (N) Jahn-Teller distortion (0.5 X 4) Marks

1	[Fe(ox) ₃] ³ -	[Ru(ox)3]3-	$[Mn(H_2O)_6]^{3+}$	$[Cu(H_2O)_6]^{2+}$
Strength of Jahn-Teller distortion	W	/ N	S	\$/

8. The frontier orbitals in a simplified MO diagram for an O_h complex with σ -donor ligands is depicted below. Draw the effect of π -bonding of an iodide ligand on **these** σ -only O_h frontier orbitals **1 Mark**

