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(r) ÊàyàuâÀà§ý ¥¨¹ãÂàà tã¹Ê qÊ â¹Àq½ãà âvâh¥ ñ **(3)**

Write note on chemical actinometer.

(y) Zà§ýàÎà ÊàyàuâÀà§ý â§ýuà §ýà ¨wà½¹t ÀÕàmà Ñß **(1)**

The quantum yield of $H_2 - Cl_2$ photochemical reaction is :

i) 10^2 ii) iii) iv)

Unit-V

ZàÎÀà-5. **(¡)** ¤ýÏtàªààm§ýL §ýà mmãu âÂàut âvâh¥ ñ ¢y§ýL yÑàumà y ºày qÀàná §ýL qÊt ¥À¹àqã §ýy Öààm §ýL kàmã Ñ? **(3)**

Write third law of thermodynamics. How the absolute entropy of solids can be determined using it?

(r) Zààm jÈr§ýLu mnà ¡Âà jÈr§ýLu qÀàná §ý vàÕàâ½à§ý ªà½ààý §ýL âww jÂàà §ýLâk¥ ñ **(3)**

Discuss the characteristic properties of diamagnetic and paramagnetic materials.

(y) ràÊ tªÂà¹ààÂà §ýà y©uà½t§ý tàÂà ¨uà Ñ? **(1)**

What is the numerical value of Bohr Magneton?

OR

(¡) âÕow ¡àí½à Öààm §ýÊÀà §ýL màqtàÂà âwâo §ýà w½ãÀà §ýLâk¥ ñ **(3)**

Describe the temperature method for the determination of dipole moment.

(r) §ýà ¡½à ytâtm Êâh§ý ¡½à ÂàÑã rÂààmà Ñ - Ðq˜ §ýLâk¥ ñ **(2)**

The molecule of does not form symmetrical linear molecule. Justify .

(y) âÂàÈÀàâvâhm §ýà qáÊsààxm §ýLâk¥ ß **(2)**

i) ÂàÂàÐ¹ ¤ýÏtà Zàtu

ii) ôÍutàÂà jÈr§ýLu ZàwâÙà

Define the following :

i) Nernst Heat Theorem

ii) Mass magnetic susceptibility

---x---

Roll No......................

Total No. of Questions : 05

Total No. of Printed Pages : 04

Code No. : B-270(B)

Annual Examination - 2017

B.Sc.-III

CHEMISTRY

Paper-III

PHYSICAL CHEMISTRY

Max.Marks : 34

Time : 3 Hrs. Min.Marks : 11

¹ãq ß Zà½u§ý ¢§ýà¢ y ¥§ý ZàÎÀà Ñv §ýLâk¥ ñ ysã ZàÎÀàà §ý ¡§ý ytàÂà Ñ ñ

Note : Attempt one question from each unit. All questions carry equal marks.

Unit-I

ZàÎÀà-1. **(¡)** Ñà¢»àkÂà qÊtà½à §ý âv¥ oìwãu âÂàÀÎàà§ý §ý qÀà t óààâ»kÊ mÊªà ytã§ýÊ½à ZààÃm §ýÊ ¥w £y§ýà mãÂà ytã§ýÊ½àà t qn§ý §ýÊ âvâh¥ ñ **(3)**

Obtain Schrodinger wave equation for hydrogen atom in terms of polar coordinate and separate into three equations.

$0.2nm$ 10^2 $H_2 - Cl_2$

(r) §ýàÈq¹Àà Zàsàw ¨uà Ñ? §ýàÈq¹Àà âwÐnàqÂà §ý âv¥ Íuk§ý âvâh¥ ¥w Zà§ýL½ààÀà §ýà½à 0°, 90° ¥w 180° §ýàÈq¹Àà âwÐnàqÂà §ýL âww jÂàà §ýLâk¥ ñ **(2)**

What is Compton effect? Write the expression for Compton shift and discuss the Compton shift at 0°, 90° and 180° scattering angles.

(y) Êâh§ý ywª ¥w §ýv ¤ýkà §ý y§ýàÊ§ý âvâh¥ ñ ¡à¢ªàÂà tàÂà ytã§ýÊ½à ¨uà Ñ? **(2)**

Write the operators for linear momentum and total energy. What is Eigen value equation?

OR

(¡) óààâ»kÊ mÊªà ytã§ýÊ½à Ðnàqm §ýLâk¥ ñ **(3)**

Establish Schrodinger wave equation.

(r) 0.2nm jà»à¢ §ý ¥§ý âwtãu rà¨y t qáÊÛý÷ ¢v¨¹ãÂà §ýL ¡àùàwÐnà ¤ýkà §ýL ªà½àÂàà §ýLâk¥ ñ **(2)**

Calculate the ground state energy of an electron confined in one-dimensional box of width .

(y) Àvà§ý âwâ§ýÊ½à âÂàut âvâh¥ ñ ¢y§ýL ¡àwÎu§ýmà ¨uà q»ã ? **(2)**

Write Planck's radiation law. What was its need?

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Unit-II

ZàÎÂà-2. (¡) âwâo õàÊà ¡àuÂà §ý ¥w ¡à0½w§ý ¡ààr¹|và §ý âv¥ mÊªà ÄývÂà §ý Íu|k§ý Ðnààqm §ýLâk¥ ñ **(3)**

Establish wave functions for BMO and AMBO molecular orbitals of ion using method.

(r) ¡à0½w§ý ¡ààr¹|v rÂàÂà §ýL ÀÎàà ¡ à §ý ¡àoàÊ qÊ , âjØà rÂàà§ýÊ Ðq˜ §ýLâk¥ â§ý ¥§ý qÊtà½à §ýà mnà ¡ààr¹|v ÀyÊ qÊtà½à §ý ¡ààr¹|v y yuQý Ñàªàà uà ÂàÑà ? **(2)**

On the basis of criteria for forming molecular orbitals, justify through diagram, whether and orbitals of one atom will combine with *s* orbital of another atom or not?

(y) ¡àuÂà t âÂàÊÂà ¤ýkà ÐmÊ §ýà âÂàÊÂààvâhm Ûýq y ÍuQý §ýÊm Ñ ß **(1)**

The lower energy of ion is represented as follows :

i) ii) $\frac{1}{2}\left(E_1-E_2\right)$ iii) $\alpha+\beta$ iv)

OR

(¡) ¥ânvàÂà ¡½à §ý âv¥ mÊªà ÄývÂà ¥w ¤ýkà §ýà qâÊ§ývÂà Ñ§ýv §ý ây÷àm §ýL yÑàumà y Öààm §ýLâk¥ ñ **(3)**

Determine the wave function and energy of ethylene molecule using Huckel's theory.

(r) y§ýâÊm §ýÕà§ý t ZàuQý qÊtà0½w§ý §ýÕà§ýà §ý ªà½àà§ýà §ýL ªà½àÂàà §ýLâk¥ ñ **(3)**

Calculate the coefficients of atomic orbitals involved in hybrid orbital.

Unit-III

ZàÎÂà-3. (¡) Y½ Êà¹|¹Ê §ýL ¤ýkà ÐmÊà §ý âv¥ Íuk§ý Íu¾qÂÂà §ýLâk¥ ñ **(3)**

Derive the expression for energy levels of rigid rotator.

(r) ÊtÂà Zàsàw ¨uà Ñ? ¥w ÊtÂà Ðq¨¹|à t ¡mÊ Ðq˜ §ýLâk¥ ñ **(3)**

What is Raman effect? Differentiate between and Raman spectra.

(y) ¡yÊv ÀààvØà §ý âv¥ wÊ½à ââut âvâh¥ ñ **(1)**

Write the selection rule for anharmonic oscillator.

OR

(¡) §ýÊqÂà Ðq¨¹|à §ý ây÷àm ¥w ¡ÂàZàuàªà §ýà w½àÂà §ýLâk¥ ñ **(3)**

Describe the principle and application of vibrational spectra.

(r) i½àÂà Ðq¨¹|t §ýL Ðq¨¹|tã Êhà ¡ à §ýL mäwmà qÊ â¹|Äq½àã âvâh¥ ñ **(3)**

Write a note on intensity of spectral lines of rotational spectra.

(y) ¡½à kà ¡â§ýu qÊÂm ÊtÂà yâ§ýu Ñß **(1)**

The molecule which is inactive but Raman active is :

i) ii) iii) iv)

Unit-IV

ZàÎÂà-4. (¡) ¢v¨¹|ààÂà§ý Ðq¨¹|t §ýL §ýqÂà yÊjÂàà §ýà Äý§ý §ýà½»|Âà ây÷àm §ý ¡àoàÊ qÊ ytlà¢¥ ñ **(3)**

Explain the vibrational structure of electronic spectrum on the basis of Franck-Condon principle.

$\frac{1}{2}\left(E_1+E_2\right)$ MO

(r) kàrvàÂÐ§ýL ¡àÊh §ý ¡ÂàyÊ ¡½à §ýL yâ§ýàum ¡wÐnà t §ýàÂà-§ýàÂà y Zà§ýàÎà-sàâm§ýLu Zà§ýt Ñàm Ñ? **(2)**

Which photo-physical processes occur in an excited state of a molecule, according to Jablonski diagram?

(y) Zà§ýàÎà-Êàyàuââ§ý â§ýuà t ¨wà½¹|à Zà§ýàÎà ¡wÎààâxm Ñàm Ñ ñ âky§ý qâÊ½ààt ÐwÛýq tàv rÂàm Ñ ñ ¡âsâ§ýuà §ýL ¨wà½¹|t ÀÕàm Öààm §ýLâk¥ ñ **(2)**

In a photo-chemical process , quanta light is absorbed. As a result mole of B is formed, calculate the quantum yield of the reaction.

OR

(¡) mnà ¡à0½w§ý ¡ààr¹|và §ýà ªà½àà¾t§ý w½àÂà §ýÊ, ¢Âà§ý ¤ýkà ÐmÊà §ý ràj yÊsw y§ýt½àà §ýL âwwjÂàà §ýLâk¥ ñ **(3)**

Give qualitative description of and molecular orbitals and discuss the possible transitions between their energy levels.

P.T.O.