B.A. / B.Sc. SEMESTER 5 EXAMINATION, 2020
FAKIR CHAND COLLEGE CENTRE (551)

INSTRUCTIONS FOR CANDIDATES

READ ALL THE INSTRUCTIONS CAREFULLY BEFORE WRITING ANSWERS

1. Total **TIME OF EXAMINATION: 2 HOURS (30 Mins. For Each Paper)**
2. **A) Question Paper Comprises Of FOUR Separate Questions – CC11 (10 Marks), CC12 (10 Marks), DSE-A2 (10 Marks) And DSE-B1 (10 Marks).**

   B) CANDIDATES MUST HAVE TO ANSWER CC11, CC12, DSE-A2 AND DSE-B1 SEPARATELY IN FOUR SEPARATE PAGES [EACH IN A A4-SIZED PLAIN PAPER).

   C) ON EACH PAPER CLEARLY MENTION ROLL NO., UNIVERSITY REG. NO. AND PAPER NO. ON TOP OF THE PAGE AND THEN BELOW WRITE ONLY THE CHOSEN OPTIONS AGAINST CORRESPONDING QUESTION NUMBERS *(For Example, If Option 'A' Is Correct For Q.1 Then Write Q.1 – A)*].

   D) Then Candidates Have To Prepare FOUR SEPARATE PDF FILES By Scanning Each Of The Four Answer Scripts Clearly [Give File Names As 'University Roll No.(Paper No.)' Format (Like 183551-XX-XXXX(CC11), 183551-XX-XXXX(CC12), 183551-XX-XXXX(DSE-A2) And 183551-XX-XXXX(DSE-B1)]

   E) Finally, Upload The Four Files One By One In The Stipulated Places Of The Google Form before Submission Of The Form.
3. Use **ONLY BLACK INK** For Writing Your Answers
4. Give **AT LEAST 1CM MARGINS** In All The Four Sides Of Each Page

2020

B.A. /B.Sc. Semester 5 Examination

University of Calcutta

CHEMISTRY – HONOURS

INTERNAL

Paper: CC 11 **F.M. 10**

FAKIR CHAND COLLEGE CENTRE (551)

Choose The Correct Answer: **1x10=10**

1. Predict which of the following pair of operators would commute

   a) $\left[\hat{L}^2, \hat{L}_z\right]$ b) $\left[\hat{L}^2, \hat{L}_x\right]$ c) $\left[\hat{L}^2, \hat{L}_y\right]$ d) all of the them

2. The probability of finding a quantum harmonic oscillator beyond the classically forbidden region for n = 0 state is

   a) 0% b) ~ (10–15)% c) > 50% d) > 70%

3. The expectation value of position coordinate *(<x>)* for the ground state of a harmonic oscillator having wave function, $\psi = \left(\frac{\alpha}{\sqrt{\pi}}\right)^{\frac{1}{2}} e^{\left(\frac{-\alpha^2 x^2}{2}\right)}$ is

   a) 0 b) $\alpha h/2\pi$ c) $\alpha^2 h^2/8\pi^2$ d) $\alpha/\sqrt{\pi}$

4. The radial wave function for 2s orbital of a hydrogen atom is $R_{2,0} = N\left(2 - \frac{r}{a_0}\right) e^{-\frac{r}{a_0}}$ where N = constant. The location of node (s) in 2s wave function is

   a) *0* b) $2a_0$, ∞ c) ∞ d) $2a_0$

5. The 2p orbital of hydrogen atom is represented as $f(r)\, r \sin\theta \cos\phi$. This function denotes

   a) $2p_x$ b) $2p_z$ c) $2p_y$ d) any one of those

6. While solving the particle in a one-dimensional box problem variationally, if one selects the trial function as $f_1 = x\,(1 - x)$ then the value of S_{11} in the secular determinant within the range (0, 1) will be

   a) 0.33333 b) 30.0000 c) 0.03333 d) 3.0000

7. For LCAO-MO treatment of H_2^+ the term $e^{-2R}\left(1 + \frac{1}{R}\right)$ is denoted as

   a) Exchange integral b) Coulomb integral c) Overlap integral d) Definite integral

8. The coefficient C_1 and C_2 in VB wavefunction of H_2 are related as

   a) $C_1 > C_2$ b) $C_1 < C_2$ c) $C_1 = C_2$ d) C_1 & C_2 are not related

9. In Maxwell-Boltzmann statistics all particles are assumed to be

   a) in distinguishable b) distinguishable c) integral spined d) half integral spined

10. The residual entropy of a crystalline substance is 9.134 $JK^{-1}mol^{-1}$ at 0K. The no. of possible orientations of that substance at this temperature is

    a) 2 b) 1 c) 4 d) 3

2020

B.A. /B.Sc. Semester 5 Examination

University of Calcutta

CHEMISTRY – HONOURS

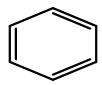
INTERNAL

Paper: CC 12 **F.M. 10**

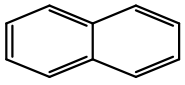
FAKIR CHAND COLLEGE CENTRE (551)

Choose The Correct Answer: **1x10=10**

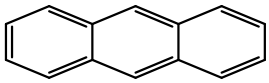
1. Choose the correct stability order



I



II



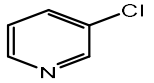
III

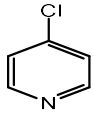
a) I>II>III b) III>II>I c) I>III>II d) II> III>I

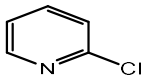
2. Electrocyclic ring closure of 4nπ electron system follows-

a) Thermal, conrotatory b) Thermal, disrotatory c) photochemical, conrotatory d) none of these

3. Choose the correct product of the following reaction-

a) 

b) 

c) 

d) none of these

4. Cis-1,2-dimethyl cyclohexane is

(a) optically active (b) optically inactive (c) both (d) none of the above.

5. Symmetry element present in tras-1,2-dimethyl cyclohexane is

(a) C_2 (b) i (c) σ (d) S_n

6. Product for (e,a) conformer of cis-2-amino cyclohexanol when treated with $NaNO_2$/HCl

(a) cyclopenta carboxaldehyde (b) cyclohexanone (c) both (d) none of the above.

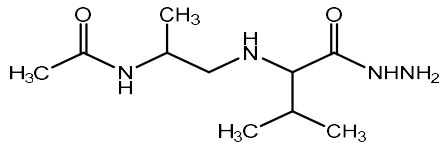
7. Trans-4-tersiarybutyl cyclohexane carboxylic acid is _____ acidic than cis-4-tersiarybutyl cyclohexane carboxylic acid. Fill up the blank with the chosen option from the following.

(a) more (b) less (c) same (d) none of the above.

8. Absolute configurations of chiral centres of D-glucose are

(a) 2R,3S,4R,5R (b) 2R,3S,4R,5S (c) 2S,3S,4R,5R (d) 2R,3S,4S,5R.

9. The number of peptide bond(s) in the following compound-



a) 1 b) 2 c) 3 d) 4

10. Number of hydrogen bond(s) in AT base pair –

a) 1 b) 2 c) 3 d) 4

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CHEMISTRY – HONOURS
INTERNAL
Paper: DSE-A2
F.M. 10
FAKIR CHAND COLLEGE CENTRE (551)

Choose The Correct Answer: **1x10=10**

1. Which one is acceptable as Fortran integer constant?
   a) 2371 b) – 47.0 c) 28E3 d) 1234500000

2. Which of the following is acceptable as integer variable?
   a) ALPHA b) J+329 c) NEXT d) N(3)M

3. Assuming mixed mode expressions find the value of the expression: 5.2+12/8
   a) 6.7 b) 6.2 c) 6 d) 2.15

4. Suppose J=5, K=10, then find the final value of J after running this Fortran program:
   IF(2*J.EQ.K)J=J+2
   J=J+3
   a) 5 b) 7 c) 10 d) 7.0

5. In Fortran 77, "Function" and "Subroutines" are
   a) Subprogram b) both can give single numerical result c) Function is used for single but Subroutine is used for multiple numerical values d) all a), b) and c)

6. In MS excel if 5 data are entered in column B, starting from the cell B2, then the sum of all the data can be calculated using the command
   a) SUM(B2:B6) in cell B7 b) =SUM(B2:B6) in cell B7 c) =SUM(B2:B6) in cell C6
   d) both b) & c)

7. For fitting data sets with a straight line passing through the origin, the syntax of the LINEST function with all fitting statistics is
   a) = LINEST (known x's, knownyx's, 1, 1) b) a) = LINEST (known y's, known x's, 0, 1)
   c) = LINEST (known y's, known x's, 1, 1) d) = LINEST (known y's, known x's, 1, 0)

8. Excel SOLVER is used for
   a) Linear regression b) non-linear regression c) solution of simultaneous equations
   d) for both b) & c)

9. For a Gaussian distribution curves
   a) Maxima will not occur at mean value b) symmetric about a vertical axis through the mean
   c) asymmetric in nature d) Total area under the curve varies for different curves

10. What will be the sample standard deviation of the given data: 25, 33, 57, 82, 98,105, 133
    a) 39.625 b) 76.143 c) 1570.143 d) 82

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University of Calcutta
CHEMISTRY – HONOURS
INTERNAL
Paper: DSE-B1
F.M. 10

FAKIR CHAND COLLEGE CENTRE (551)

Choose The Correct Answer: **1x10=10**

1. An enamel is
   a) a pigmented varnish
   b) a dispersion of rubber-like resin in water
   c) a colloidal dispersion of solution of cellulose
   d) a pigmented lacquer

2. An example of a thinner is
   a) linseed oil b) soyabean oil c) benzene d) dehydrated castor oil

3. The composition of lead glass is
   a) $Na_2O.\ CaO.\ 6SiO_2$ b) $K_2O.\ PbO.\ 6SiO_2$ c) $Na_2O.\ 3CaO.\ 6SiO_2$ d) $K_2O.\ 3PbO.\ 6SiO_2$

4. The function of alumina in cement is to
   a) make the cement quick-setting b) make the cement efflorescent
   c) impart strength to the cement d) retard the setting action of cement

5. A fuel cell
   a) converts the chemical energy of the fuels indirectly to electricity
   b) converts the heat energy of the fuels directly to electricity
   c) converts the solar energy of the Sun directly to electricity
   d) converts the chemical energy of the fuels directly to electricity

6. Which among the following is not a macroscopic property of carbon nanotubes?
   a) high tensile strength b) high chemical activity c) high electrical conductivity
   d) high ductility

7. RDX is
   a) cyclohexamine trichloride b) cyclomethylene tetranitrosylamine
   c) cyclohexamine trinitroamine d) cyclomethylene trinitroamine

8. Nitrolim is
   a) a mixed fertilizer b) a ceramic c) a dye d) a superconducting oxide

9. Nitriding is a process of getting
   a) super-glossy surface b) semi-hard surface c) super-hard surface d) super-soft surface

10. Which among the following is not a reason for catalyst deactivation?
    a) catalyst poisoning b) thermal degradation c) catalyst fouling d) oxidation