B.A. / B.Sc. SEMESTER 5 EXAMINATION, 2021
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 193551-XX-XXXX(CC11), 193551-XX-XXXX(CC12), 193551-XX-XXXX(DSE-A2) And 193551-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 BLUE INK (Writings MUST be clearly visible)** For Writing Your Answers
4. Give **AT LEAST 1CM MARGINS** In All The Four Sides Of Each Page

2021

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) both

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%

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) $\alpha^2 h^2/8\pi^2$

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) ∞

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) $2p_y$

6. The residual entropy of a crystalline substance is 9.134 JK-1mol-1 at 0K. The no. of possible orientations of that substance at this temperature is

a) 2 b) 1 c) 3

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) $C_1 = C_2$

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

a) in distinguishable b) distinguishable c) half integral spin

10. 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) 0.13333 c) 0.03333

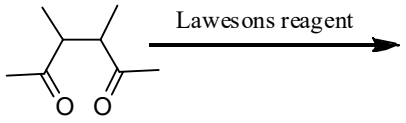
2021
B.A./B.Sc. Semester-5 Examination
University of Calcutta
CHEMISTRY – HONOURS
INTERNAL EXAMINATION
Paper:CC12
F.M. – 10

FAKIR CHAND COLLEGE CENTRE (C551)

Choose the correct optionineachcase andreport(noneedtowrite theanswer insentence): **1x10**

ANSWER ALL THE QUESTIONS

1. Anthracene undergoes [4+2] cycloaddition reaction through
   a) 9, 10 positions b) 1,2 positions c) 2, 3 positions
2. Correct basicity order-
   a) pyridine > quinoline > isoquinoline b) pyridine > isoquinoline > quinoline
   c) quinoline > isoquinoline > pyridine
3. Obtained product of the following reaction is-



   a) thiophene derivative b) pyrrole derivative c) pyridine derivative
4. *cis*-1,2-dimethyl cyclohexane is-
   a) optically active b) optically inactive c) none of these
5. Product for (e,a) conformer of cis-2-amino cyclohexanol when treated with $NaNO_2$/HCl
   a) cyclopentacarboxaldehyde b) cyclohexanone c) both .
6. Mutarotation happens in presence of
   a) polar solvent b) nonpolar solvent c) amphiprotic solvent .
7. Isoelectric point of an amino acid is that where
   a) the amino acid has no net charge
   b) both the α-amino and carboxyl groups exist in non-ionic form
   c) none of the above
8. During peptide synthesis the role of DicyclohexylCarbodiimide is
   a) an activated intermediate formation by combining with the carboxyl group of an amino acid
   b) a blocking agent of the N-terminal of an amino acid
   c) act as a resin in Merrifield peptide synthesis
9. Number of hydrogen bond(s) in A-T base pair
   (a) 1 (b) 2 (c) 3
10. The phosphodiester linkage in a RNA molecule is formed between
    a) 2′ and 5′ end of two sugar moieties
    b) a base and a sugar moieties
    c) 3′ and 5′ end of two sugar moieties

2021
B.A. /B.Sc. Semester 5 Examination
University of Calcutta
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

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

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

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

5. In Statistics, the t – test is used with sample size "N" and population variance "σ", when
   a) $N < 30$, σ known b) $N < 30$, σ unknown c) $N > 30$, σ known

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:B5) in cell B6 c) =SUM(B2:B6) in cell C6

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 y's, known x's, 0, 1) b) = LINEST (known x's, known y's, 1, 1)
   c) = LINEST (known y's, known x's, 1, 1)

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

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

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) 82

2021
B.A./B.Sc. Semester 5 Examination
University of Calcutta
CHEMISTRY – HONOURS
INTERNAL EXAMINATION
Paper : DSE-B1
F.M. – 10

FAKIR CHAND COLLEGE CENTRE (C551)

Choose the correct option in each case and report (no need to write the answer in sentence):1x10

ANSWER ALL THE QUESTIONS

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

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

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

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

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 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

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

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

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

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