



CHJ-7201

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Chemistry : Paper - IV - CHNN - 401

("Inorganic Chem.") (New Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instruction : All questions are compulsory.

I Answer any two of the following in detail : 18

(1) Explain the V.S.E.P.R. theory with appropriate examples.

(2) Explain the atomic inversion by proper illustration.

(3) Write short notes on :

(i)  $d\pi - p\pi$  bonding

(ii) Bent rule.

Answer in detail : (any two)

(1) What is chelate effect ? Explain the chelate effect with appropriate example and thermodynamic origin for metal complexes.

(2) Explain the spectrophotometric method for determination of binary formation constant.

(3) Explain the factors affecting the stability of the metal complexes.

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[Contd...

18

Answer any two of the following in brief :

(1) Explain the inert and labile complexes with taking appropriate examples.

(2) Explain the electron transfer reactions.

(3) What is trans effect ? Explain the substitution reaction in square planer complexes of Pt.

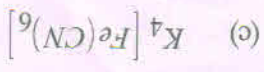
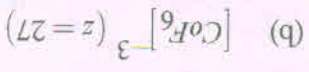
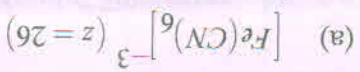
17

Answer any two of the following :

(1) Explain the M.O. theory for octahedral complexes of CO. (III).

(2) Explain the Tanabe - Sugano diagram for the  $d^2$  case.

(3) Calculate the C.F.S.E. value for the following complexes :





CHK-7301

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

CHN - 401 : Inorganic Chemistry

(Inorganic Chemistry) (Old Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instruction : All questions carry equal marks.

- 1 Answer any two of the following questions : 18
- (1) Discuss the Free Radical Reactions.
  - (2) Write a detailed note on " $d\pi - p\pi$  bond".
  - (3) Draw Walsh diagram for  $ML_2$  molecules.
- 2 Answer any two of the following questions : 17
- (1) Write a note on "Chelate effect".
  - (2) Explain Spectrophotometric method for determination of stability constant of complex.
  - (3) Establish a relationship between stepwise and overall stability constant,

- 3 Answer any two of the following questions : 18
- (1) Explain the evidences in favour of  $SN^1CB$  mechanism.
  - (2) Explain Outer Sphere Mechanism for substitution reactions in octahedral complexes.
  - (3) Write a short note on "Trans effect".
- CHK-7301 ] I [ Contd...

- 4 Answer any two of the following questions : 17
- (1) Draw and Discuss MO Energy level diagram for  $[CoF_6]^{-3}$ .
  - (2) Explain the splitting of d-orbitals in Tetrahedral field.
  - (3) Answer the following questions.
    - (i) Explain the Limitations of CFT.
    - (ii) Describe the factors affecting the value of  $\Delta_o$ .



CHK-7310

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Chemistry : Paper - 402

(Organic Chemistry) (Old Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions :

(1) All questions are compulsory.

(2) The medium of answer is English only.

1 Answer any two of the following :

(1) State the Huckel's rule of aromaticity. Define the terms aromaticity, non aromaticity and antiaromaticity. Give atleast four example.

(2) Give two methods for the synthesis of crown ethers. Define cryptand, rotaxanes and fullerenes with suitable illustration.

(3) Apply the polygon rule of 3 to 5 carbon systems and indicate the character of the molecular orbitals. Predict the aromatic character of cyclopentadienyl anion, cyclooctatetra ene and cyclopropenyl ion.

2 Answer any two of the following :

(1) Explain the stereospecific and stereoselective reaction with suitable examples.

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- 11
- 
- 17
- 4
- Answer any two of the following :
- (1) Give detail account on  $SN^1$  and  $SN^2$  mechanism with its evidences.
  - (2) Discuss the effect of substrate structure affecting reactivity in  $SN^1$  and  $SN^2$  reaction.
  - (3) Write a note on : Ambident nucleophiles and Regioselectivity.
- 18
- 3
- Answer any two of the following :
- (1) Discuss the curtin - Hammett principle and show that Hammett equation is liner free energy relationship.
  - (2) Discuss the stability and reactivity of carbenes and nitrene.
  - (3) Write a note on classical and non-classical carbocation and application of NMR spectroscopy in the detection of carbocation.
- 19
- 2
- Answer any two of the following :
- (2) What is resolution ? Discuss the methods of resolution for racemic modifications.
  - (3) Give detail account on principle categories of asymmetric synthesis.



CHJ-7209

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Chemistry : CHNN - 402

(Organic Chemistry)

(New Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions :

- (1) This question paper carries four questions.
- (2) Figures to the right indicate marks of the question.

1

Answer any two of the following :

- (a) Discuss alternant and non-alternant hydrocarbons. Give a detailed account of catenanes.
- (b) Discuss resonance, Hyperconjugation and Tautomerism with suitable examples.
- (c) Write short note :
  - (i) Types of bonding in Fullerenes.
  - (ii) Aromaticity of Annulenes.

18

2

Answer any two of the following :

- (a) What is Conformation ? Discuss conformational analysis of cyclohexane and decalins.
- (b) Explain stereochemistry of sulphur and phosphorus containing compounds.
- (c) What is the difference between stereospecific and stereoselective reactions ? Discuss optical activity of allenes giving illustrations.

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[ Contd...

- 3 Answer any two of the following :
- Give the thermodynamic and kinetic requirements of the reaction. Explain Hammett equation and linear free energy relationship.
  - Discuss the stability and reactivity of following :
    - Carbocations
    - Carbanions
  - Derive rate equation which takes into account steric effect. Explain Hard and Soft electrophiles and nucleophiles.
- 18
- 4 Answer any two of the following :
- Discuss effect of the leaving group and solvent on nucleophilic substitution.
  - Write short note :
    - Ambident nucleophiles
    - Anchimeric assistance.
  - Explain Sandmeyer and Hunsdiecker reaction.
- 17





CHJ-7217

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

CHHN - 403 : Physical Chemistry

(New Course)

Time : 2 1/2 Hours]

[Total Marks : 70

18

Answer any two of the following :

- (1) Derive the wave equation for linear harmonic oscillator.
- (2) Apply perturbation theory to non-degenerate system.
- (3) Discuss the approximate methods for the solution of Schrodinger wave equation for hydrogen and helium atoms.

17

Answer any two of the following :

- (1) What do you understand by ordinary angular momentum and generalized angular momentum.
- (2) Explain the Huckel theory of conjugated system.
- (3) What are electron spin functions ? Explain in the light of Pauli's principle.

12

(a) Answer any two of the following :

- (1) Explain free energy with proper derivation and give physical significations of free energy.
- (2) Write a note on excess functions for non-ideal systems. Derive various thermodynamic functions.
- (3) Define partial molar properties. How partial molar properties of a system is determined by direct method ?

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[ Contd...

- (b) Answer any one of the following :
- (1) Compare the ionic strength of solutions of (i) A uni-uni valent (ii) A uni-bi valent bi-uni valent and (iii) bi-bi valent electrolyte at the same morality (m). Assuming complete ionization. Calculate the fugacity of  $N_2$  gas at  $0^\circ C$  and pressure of 100 atm and 800 atm, it being given that the value of integral  $\frac{a}{RT}$  between  $P = 0$  and  $P = P$  is 0.0320 at 100 atm and -0.3980 at 800 atm.
- (a) Answer any two of the following :
- (1) Explain thermodynamic probability and most probable distribution.
  - (2) Derive equation for Prigogines principle of entropy production.
  - (3) Derive equations for various in terms of thermodynamics functions in terms of partition function.
- (b) Answer any one of the following :
- (1) Calculate the translation partition function of  $O_2$  at 1 atm pressure and  $25^\circ C$  temperature moving in a vessel of volume  $24.4 \text{ dm}^3$ . ( $M = 16.0 \text{ gm/mole}$ ,  $k = 1.38 \times 10^{-16} \text{ erg/molecule}$ ,  $h = 6.624 \times 10^{-27} \text{ erg. sec}$ ,  $R = 82.06$ ) Calculate the rotational contribution to the entropy of  $NH_3$  at 400 K.  $I_a = I_b = 8.69 \times 10^{-46} \text{ kg.m}^2$ ,  $I_c = 16.6 \times 10^{-46} \text{ kg.m}^2$ ,  $g=3$ ,  $R = 8.314 \text{ J.}$

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12

4

6



- 4 (a) Answer any two of the following :  
 (1) Explain : Thermodynamic probability.  
 (2) Discuss Entropy Production in heat flow  
 (3) Explain : Vibration partition function.

(2) Write a note on partial molar enthalpy.

- (1) From the plot vs.  $P$  for  $\text{CO}$ , the area under the curve between 0 to 100 atm pressure was found to be 0.0789 atm<sup>2</sup> and 0°C.  
 calculate the fugacity of  $\text{CO}$  at 100 atm

(b) Answer any one of the following :

- (3) Explain in detail : Variation of chemical potential with temperature.  
 (2) Determine the activity coefficient of electrolytes using emf method.

(1) Explain zeroth law of thermodynamics and concept of temperature.

- (1) Explain mathematical representation and law of thermodynamics.

(a) Answer any two of the following :  
 14

(b) 1, 3 - Butadiene.

(a) Ethylene

- (2) Apply the Huckel - Molecular orbital theory to following :

(1) Discuss Pauli's exclusion principle.

(b) Answer any one of the following :  
 4



- (b) Answer any one of the following :
- 3
- (1) Calculate the translational partition function for 1 mole of an ideal gas. (At wt.  $28 \times 10^{-3}$  kg) at  $25^\circ\text{C}$ .
- (2) Write a note on Translation Partition function.





CHJ-7225

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Symmetry, Group Theory & Spectroscopy :

CHNN - 404

(Core Compulsory)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions : (1) All question are compulsory & to be written in English only.

(2) Students will be provided character table.

I Answer any two : 18

(a) Find  $\chi_N$  for the following.

$H_2O$ ,  $Cl_4$  and  $NH_3$ .

(b) Give an account on direct product. What are the applications of it?

In the groups mentioned, determine the direct product representation and reduce them.

(i)  $E \times E$  in  $C_4V$

(ii)  $E \times E$  in  $C_3V$

(c) Explain what is character table? Explain different parts of it.

Constant character table for  $C_3V$  point group using properties of irreducible representations.

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- 4 Answer any two :
- (a) Give a detailed account on interpretation of isomer shifts.
  - (b) Write a note on quadruple interaction. What is quadrupole splitting ?
  - (c) How can you use Mossbauer spectra to find oxidation states ? What is the effect of pressure on M.B spectra ? Use M.B. spectra to distinguish cis / trans isomers.

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- 3 Answer any two :
- (a) Give an account of natural line broadening.
  - (b) Discuss the uncertainty principle.
  - (c) Explain absorption, refraction, polarization, scattering and emission of emr.
- Write a note on derivation of selection rules.

18

- 2 Answer any two :
- (a) Discuss the hybridization schemes ( $\sigma$  orbital) for  $SF_6$  (Oh).
  - (b) Find out various stretching and bending vibration for  $PtCl_4^{2-}$  (square planar) and their IR / Raman activities.
  - (c) Give  $\pi$  orbital hybridization schemes for  $BF_3$  (planar).

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CHK-7328-40

M. Sc. (Sem. I) Examination

November - 2019

Chemistry : Paper - IV

1. CHN - 404(A) : Group Theory, Spectroscopy & Diffraction Methods

2. CHN - 404(B) : Mathematics for Chemists (Old Course)

Time : 2 Hours]

[Total Marks : 50

1. CHN - 404(A) : Group Theory, Spectroscopy & Diffraction Methods

1 (a) Answer any two : 10

(i) Illustrate representation of  $C_{3v}$  group by matrix.

(ii) Give a detailed account on character table.

(iii) Discuss the vibration and rotation spectra of a Diatomic molecule.

6 (b) Answer any two : 6

(i) What is Born - Oppenheimer approximation ?

(ii) Explain reducible and irreducible representation.

(iii) Explain the term anharmonicity. Answer any two : 4

(i) Illustrate diagrammatically that  $H_2O$  molecule is Abelian where as  $NH_3$  molecule is non-abelian.

(ii) Explain the matrix representation of symmetry operations of  $C_{2h}$  point group

(iii) What are Mulliken's symbols ?

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- 10 (a) Answer any **two** :  
 (i) Discuss the Mossbauer spectrum of Fe complexes.  
 (ii) Explain Bragg's equation.  
 (iii) Explain the Ramchandran diagram.
- 6 (b) Answer any **two** :  
 (i) What is Quadrupole interaction? Explain "Zeeman effect"  
 (ii) Explain the Debye-Scherrer method.  
 (iii) What are Miller indices ?
- 4 (c) Answer any **two** :  
 (i) What are index reflections?  
 (ii) Give the statement of Frank - Condon principle  
 (iii) Define the terms :  
 (1) Dispersion  
 (2) Transmission.
- 3 Answer any **five** of the following :  
 (i) Explain the point group of Allene.  
 (ii) What is Doppler effect in Mossbauer spectroscopy.  
 (iii) What is reflection and refraction of light ?  
 (iv) How can you decide  $\pi$  - bond strengths of various legends using Mossbauer spectroscopy ?  
 (v) What is electromagnetic radiation ?  
 (vi) What is nuclear quadrupole ?  
 (vii) The minimum X-Ray wavelength produced for an X-Ray machine operated at 30 KV, what will be value of  $\lambda_{min}$  ?



2. CHN - 404(B) : Mathematics for Chemists (Old Course)

1 Answer any four of the following questions : 20

- (1) Describe the curl theorem of vector calculus.
- (2) Discuss the properties of matrix multiplication with illustrations.
- (3) Explain the dot and cross product of vectors with illustrations.
- (4) Discuss the conditions for solving simultaneous linear equation using matrix theory.
- (5) Discuss the Gauss-divergence theorem of vector calculus.
- (6) Discuss applications of separation of variables in quantum chemistry.

2 Answer any four of the following questions : 20

- (1) Elaborate applications of differential calculus in chemistry.
- (2) Describe the transformation of Cartesian to polar coordinates.
- (3) Explain the various rules for derivatives.
- (4) Elaborate the applications of integral calculus in chemistry.
- (5) Describe the least square method and its applications in curve fitting.
- (6) Describe applications of exact first-order differential in chemical kinetics.

3 Answer any ten of the following short questions : 10

- (1) Draw a diagram to show two equal vectors.
- (2) Differentiate the speed and velocity with proper example.
- (3) Write vector expressions for the diagonals of the square.
- (4) Write an example of symmetric matrix.



- (5) If matrix  $A$  is Hermitian if and only if  $A^*$  is Hermitian - Justify the statement.
- (6) If order of matrix  $A$  is  $m \times n$  and order of matrix  $B$  is  $n \times p$ , then, what is order of  $AB$  ?
- (7) What is the second-order differential ?
- (8) Write Legendre equation.
- (9) Differentiate between slope and tangent.
- (10) At maxima, slope is zero - Justify the statement.
- (11) If four billion coins are tossed simultaneously, what result will be observed ?
- (12) Show the intercept and slope on a plot of  $y = 8x + 2$ .
- (13) What is the number of distinct arrangement of the letters of the word UGCCSIR so that U and I cannot come together ?



- (b) Attempt any two :
- (1) Turbo C
  - (2) DOS
  - (3) MS-Word
- 3 (a) Attempt any three :
- (1) Linear regression
  - (2) Input Output devices
  - (3) Function
  - (4) Procedure
  - (5) Foxpro
- (b) Attempt any five :
- (1) Header and Footer in MS-Word.
  - (2) RAM
  - (3) ROM
  - (4) Processor
  - (5) Orientation types of page in MS Word.
  - (6) Page Break
  - (7) While Loop
  - (8) If Loop
- 6
- 6

(2) Computational Chemistry : CHN - 403(B)  
(Elective) (New Course)

1 (a) Answer any one of the following : 6

(1) Discussion of algorithms and errors for the numerical method.

(2) Write a note on feature of FORTRAN-C programmes.

(b) Answer any two of the following : 6

(1) Explain Bisection method in solving polynomial and transcendental equations.

(2) How can Gaussian elimination used to Gauss-Seidel method.

(3) Explain Newton-Raphson method.

2 (a) Answer any one of the following : 6

(1) Describe "Pivoting Strategy."

(2) Explain Jacobi and Householder method.

(b) Answer any two of the following : 6

(1) Give method to Polynomial wiggle problem.

(2) Uses of quantum chemical packages.

(3) Give the solution of simple differential equations by Taylor series.

- 3 (a) Answer any **three** of the following :
- (1) Give the uses and Auto-cad for atom structure draw.
  - (2) Internet and android app uses in chemistry.
  - (3) Give method to Polynomial wiggle problem.
  - (4) Uses of Mail Merge.
  - (5) Use of Header/Footer in MS Word.
- 6 (b) Answer in short any **five** of the following :
- (1) Any two names of I/O devices.
  - (2) Meaning of caps lock.
  - (3) Short key for Format painter and print.
  - (4) Difference between windows and UNIX O.S.
  - (5) Meaning of RAM.
  - (6) Short key for save and copy.
  - (7) Name of formula for antilog.
  - (8) What is a flow-chart ?



(3) Organic Spectroscopy : Paper - 405(C)

- 6 (a) Answer any one of the following :
- (i) What is decoupling ? Describe the protondecoupled and proton-coupled spectra of 2°-butyl bromide.
- (ii) Write a short note on chemical shift.
- (b) How hybridization affect on its value.
- 6 (b) Determine the structure of any one of the following :

(i) MF :  $C_6H_{10}$

(a) Triplet  $\delta$  2.9

(b) Triplet  $\delta$  2.3

(c) Doublet  $\delta$  127.2

(ii) MF :  $C_3H_5Br$

(a) Triplet  $\delta$  3.6

(b) Doublet  $\delta$  134.2

(c) Triplet  $\delta$  118.8

- 2 Answer any one of the following :

(i) MF :  $C_8H_{10}O$

UV :  $\lambda_{max}$  257 nm

IR : 3350(b), 3090(s), 3070, 1545(s),

1525(s), 1125(s), 750(s), 700(s)  $cm^{-1}$

NMR : (a) (5H) Singlet  $\delta$  7.2

(b) (2H) Triplet  $\delta$  3.7

(c) (2H) Triplet  $\delta$  2.7

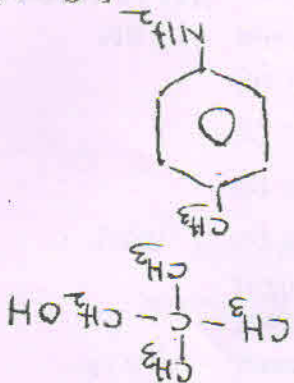
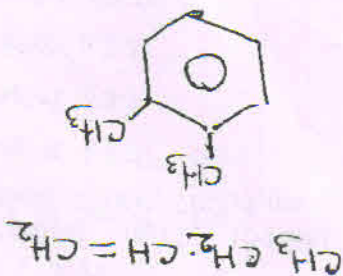
(d) (1H) Singlet  $\delta$  3.15

MS : m/e 122, 92, 91

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3 (a) Answer any **one** of the following : 6

(i) Write a note on  $\gamma$ -effect and Geometric isomers.

(ii) Write splitting of compounds in CMR spectra.

- (ii) MF :  $\text{C}_8\text{H}_8\text{O}$
- UV :  $\lambda_{\text{max}} 281 \text{ nm}$  (-max 3.0)
- IR : 3010 - 3070(m), 2945 - 2885(m), 1694(s), 1498, 1250(s), 1040(m), 750(s), 685(s)  $\text{cm}^{-1}$ .
- NMR : (a) (3H) Singlet  $\delta 2.46$   
 (b) (3H) Multiplet  $\delta 7.50$   
 (c) (2H) Multiplet  $\delta 7.85$
- MS : m/e 51 77 105 120  
 r.a. (43%) (100%) (80.8%) (23%)

- (b) Answer any two of the following :
- (i) What is molecular ion peak ?  
Describe the characteristic and uses of MIP.
- (ii) Write a note on :  
(a) Isotope peak  
(b) Metastable ion peak.



CHJ-7204

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Physics : CC - 101

(Mathematical Physics-I & "C" Programming-I)

[Total Marks : 70

Time :  $2\frac{1}{2}$  Hours]

1 (a) Attempt any one :

(1) State and prove Cauchy-integral formula.

(2) Explain Residue theorem.

(b) Attempt any two :

8

(1) Find residue of  $\frac{\sin z}{1-z^4}$  at  $z = 1$ .

(2) State and briefly explain Cauchy theorem.

(3) Evaluate the following definite integrals by using Residue theorem

$$\int_0^{2\pi} \frac{1}{5+4\cos\theta} d\theta.$$

(c) Attempt any one :

2

(1) Define complex quantity.

(2) What is mapping ?

7

(a) Attempt any one :  
(1) Explain Laplace transform in detail with its properties.  
(2) Discuss Fourier transform in detail.

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[Contd...

- (b) Attempt any two : 8
- (1) Find Laplace transform of  $F(t) = \frac{\sin at}{t}$ .
  - (2) Solve by Laplace Transform method :  $y'' + 4y' + 4y = t^2 e^{-2t}$  with initial condition  $y_0 = 0, y_0' = 0$ .
- (c) Write a note on Bromwich integral. 2
- (c) Attempt any one : 2
- (3) Write a note on Bromwich integral.
  - (1) Attempt any one :
- (a) Attempt any one : 8
- (1) Explain For statement with an example.
  - (2) Discuss decision making loop with flow charts with summation square of an integer upto 10 as an example.
- (b) Attempt any two : 8
- (1) Explain multidimensional arrays.
  - (2) Explain procedure for skipping a part of a loop.
  - (3) Explain one dimensional array initialization using block structure.
- (c) Attempt any one : 2
- (1) Write the general form of a multi-dimensional array.
  - (2) Which statement is used to skip a part of the statement in a loop ?



- 4 (a) Attempt any **one** :
- (1) Explain string array. Write a program to read series of words from a terminal.
  - (2) Explain multifunction program with appropriate block and flow chart.
- (b) Attempt any **two** :
- (1) Explain about Declaring and Initiating string variables.
  - (2) Write a definition of function in C with block example.
  - (3) Explain scan f structure to read character from a terminal.
- (c) Attempt any **one** :
- (1) Define Array.
  - (2) Define Function.
- 7
- 8
- 2



CHJ-7212

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Physics : MSPHY-CC-102

(Classical Mechanics I & Electrodynamics - I)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

**Instruction :** Symbols have their usual meaning.

- 1 (a) Answer the following : (any one) 8
- (1) Discuss gage transformation and generating function in detail.
- (2) Using proper illustration discuss condition for transformation to be canonical.
- (b) Attempt any two of the following : 8
- (1) Derive canonical equation in terms of Poisson's bracket.
- (2) Find out the solution of simple Harmonic Oscillator using Hamilton - Jacobi equation.
- (3) Show that if Hamiltonian H and quantity F are constants of the motion,  $df/dt$  must be a constant.

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- 3 (a) Answer the following : (any one) 8
- (1) Describe case of reflection at the surface of a conductive medium.
  - (2) Discuss Conductor and Dielectric, describe wave propagation in good Dielectric.
- 3 (c) Answer the following : (any one) 2
- (1) What do you mean by degree of freedom ?
  - (2) Give the example of damped oscillation.
- 3 (b) Attempt any two of the following : 8
- (1) Explain motion of symmetric top.
  - (2) Show that the eigen values of symmetric matrix are real.
  - (3) Write notes about inertia tensor.
- 2 (a) Answer the following : (any one) 7
- (1) What are Euler angle ? Draw a neat diagram showing this angle.
  - (2) What is equilibrium ? Discuss different kinds of equilibrium.
- 2 (c) Answer the following : (any one) 2
- (1) Define Canonical transformation.
  - (2) Define generating function.

- (1) Explain wave between parallel plane.  
 (2) Calculate power loss in a simple Resonator.  
 (3) Verify that  $|V||I|\cos\theta = V_{re}I_{re} + V_{im}I_{im} = \text{Re}VI^*$

(b) Attempt any two of the following : 8

- (1) Describe TE and TEM.  
 (2) State and prove Poynting theorem.

(a) Answer the following any one : 7

(2) Define Polarization.

(1) What is Shell's law ?

(c) Answer the following any one : 2

oblique incidence.

(3) Explain reflection by a perfect insulator

$$\pi = 1000\pi\mu$$

MHZ, Assume  $\sigma = 1 \times 10^7$  mhos/m,

normally on a sheet. of iron use  $f = 1$

an electro magnetic wave incident

(2) Determine the reflection coefficient for

normal incidence.

(1) Explain reflection by a perfect conductor

(b) Attempt any two of the following : 8

(c) Answer the following : (any one)

(1) What is TE<sub>10</sub> Mode ?

(2) Write the expression of total energy density due to electric and magnetic fields.





\* C H J - 7 2 2 0 \*

CHJ-7220

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Physics : MSPHY - 103 - CC

(Quantum Mechanics - I & Solid State Physics - I)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions : (1) Symbols used have usual meaning.

(2) Numbers on R.H.S. indicate marks of

the questions.

1 (a) Attempt any one : 8

(1) Discuss the isotropic oscillator with necessary equation.

(2) Explain unitary transformation induced by change of coordinate system: Translation.

(b) Attempt any two : 8

(1) Write a note on Heisenberg picture.

(2) Prove that eigen value of self adjoint operator is real.

(3) Discuss state vectors in Dirac notation.

(c) Attempt any one : 2

(1) Define Hilbert space.

(2) What is quantum dynamics ?

CHJ-7220]

1

[ Contd...

- 2 (a) Attempt any one :
- (1) Using commutation relation obtain the eigen value spectrum of operator  $J^2$  and  $J_z$  for the state  $l j m >$
  - (2) Discuss matrix representation of  $J$  in the  $l j m >$  basis. Determine the matrix elements of  $J_+$  and  $J_-$ .
- (b) Attempt any two :
- (1) State Pauli's spin matrices  $\sigma_x, \sigma_y, \sigma_z$ . Prove that  $\sigma_x^2 + \sigma_y^2 + \sigma_z^2 = 3$ .
  - (2) Prove the commutation relation  $[J_z, J^2] = 0$
  - (3) Prove the identity  $[J_x^2, J_y^2] = [J_y^2, J_z^2] = [J_z^2, J_x^2]$ .
- (c) Attempt any one :
- Prove  $[J_+, J_-] = 2\hbar J_z$ .
- (i)  $J^+ J^- j > =$  \_\_\_\_\_
  - (ii)  $J^- J^+ j > =$  \_\_\_\_\_
- 3 (a) Attempt any one :
- (1) Describe the Kronig-penney model with necessary equations.
  - (2) Explain the nearly free electron model in detail.
- (b) Attempt any two :
- (1) Describe Bloch functions.
  - (2) Explain energy gap with necessary equations.
  - (3) What are the important conclusions of the number of orbitals in a band ?
- 8
- 8
- 2
- 7

- (c) Attempt any **one** : 2
- (1) What are semimetals ?
  - (2) What is mobility ?
- (c) Attempt any **one** : 2
- (1) Give physical interpretation of the effective mass.
  - (2) Write short note on Acceptor states.
  - (3) Explain thermo electric effects on semiconductor specimen.
- (b) Attempt any **two** : 8
- (1) Describe optical absorption processes to obtain band gap.
  - (2) Derive the equation of motion of an electron in an energy band. Discuss its transfer of momentum.
- (a) Attempt any **one** : 7
- (1) State the Bloch theorem.
  - (2) What is first Brillouin zone ?
- (c) Attempt any **one** : 2



CHJ-7228

Seat No. \_\_\_\_\_

M. Sc. (Physics) (Sem. I) Examination

November - 2019

MSPHY-104CC - Electronics - I

Time : 2:30 Hours ] [ Total Marks : 70

Instructions : (1) All five questions carry equal marks.

(2) Figures on R.H.S. indicate individual

marks.

(3) The symbols have their usual

meanings.

1 (a) Answer the following : (any one out of two) 8

(1) Explain FET parameters in detail.

(2) Explain depletion MOSFET in detail

with its construction and characteristics.

(b) Attempt any two of following : (out of three) 8

(1) Explain fixed bias self bias of FET.

In the fixed bias circuit  $V_{GG} = 1.5\text{ V}$ ,  $V_{DD} = 15\text{ V}$ ,  $R_D = 1.5\text{ kohm}$ .

(2)  $R_G = 2\text{ Mohm}$ ,  $I_{DSS} = 15\text{ mA}$  and  $V_p = -4\text{ V}$ . Determine gate source voltage

$V_{GS}$ , Drain current  $I_D$  and drain source voltage  $V_{DS}$ .

(3) Explain common source amplifier with its equivalent circuit.



- (c) Answer the following : (any one out of two) 2
- (1) The sound wave is converted into electrical wave by \_\_\_\_\_ in power amplifier system.
  - (2) The transistor with comparatively \_\_\_\_\_  $\beta$  is used in power amplifier.
- (b) Attempt any two of following (out of three) 8
- (1) Explain performance quantities of power amplifier.
  - (2) For class A series fed CE large signal amplifier using resistive load, the maximum and minimum values of collector-emitter voltages are 20V and 10V and maximum and minimum values of collector current are 10mA and 5mA when a.c. signal is applied to it. Determine r.m.s. values of collector voltage and collector current and a.c. power output.
  - (3) Explain class B push pull amplifier in detail.
- (a) Answer the following : (any one out of two) 7
- (1) Explain differences between voltage amplifier and power amplifier.
  - (2) Explain class A power amplifier in detail.
- (c) Answer the following : (any one out of two) 2
- (1) What is full form of MOSFET ?
  - (2) Give names of all FET terminals.



- 3 (a) Answer the following : (any one out of two) 8
- (1) Derive equation of phase shift in high pass RC circuit or sinusoidal input signal.
  - (2) Explain zero level clamping and negative positive peak clamping and negative peak clamping.
- (b) Attempt any two of following : (out of three) 8
- (1) Discuss high pass RC circuit for step voltage input and pulse input.
  - (2) The square wave having  $T=5\mu s$  and overall amplitude of 10V is applied to a differentiating circuit in which  $R = 10 k\Omega$  and  $C = 1000 pF$ . Determine the tip values of the output waveforms.
  - (3) Drive equation of phase shift in low pass RC circuit with sinusoidal input signal.
- 4 (a) Answer the following : (any one out of two) 7
- (1) Write note on IC technology with its advantages and limitations.
  - (2) Explain internal block diagram of IC 555.
- (c) Answer the following : (any one out of two) 2
- (1) Define linear networks.
  - (2) Give two examples of nonlinear wave shaping circuits.

- (b) Attempt any two of following : (out of three) 8
- (1) Explain basic steps to construct basic monolithic IC.
  - (2) For the 555 Timer oscillator, calculate the value for  $R_A$  and  $R_B$  so that the oscillator has a frequency of 2.5 kHz @ 60% duty cycle.
  - (3) Write note on monostable multivibrator using IC 555.
- (c) Answer the following : (any one out of two) 2
- (1) The \_\_\_\_\_ (component) cannot be integrated directly in IC. (inductors, capacitors, Resistors)
  - (2) The output of IC 555 remains \_\_\_\_\_ when capacitor is charging in astable multivibrator.



CHK-7304

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Physics : CPH - 401

(Mathematical Physics - I &

Quantum Mechanics - I)

[Total Marks : 70

Time :  $2\frac{1}{2}$  Hours]

Instructions: (1) Symbols Used have usual meanings  
(2) Figures to the right indicate marks of the question.

1. (a) Attempt any one

(1) State the residue theorem. Discuss methods of finding residues.

(2) Prove Cauchy integral formula in detail.

(b) Attempt any one

(1) Discuss Laurent series with one example.

(2) Find the residue of  $\frac{\sin z}{(1-z^4)}$  at  $z=i$ .

2. (a) Attempt any one

(1) What is Laplace transform? Write and derive properties of Laplace transform.

(2) Discuss Inverse Laplace transform. Find the inverse Laplace transform of

$$F(p) = \frac{1}{[(p+a)(p^2+b^2)]}$$

1

CHK-7304]

[Contd...

- (2) write note on Selection rules.  
 (1) Discuss Sudden approximation.  
**(b) Attempt any one.** (5)

- (2) Describe propagator in detail.  
 schrodinger equation using WKB method.  
 asymptotic solution of the one dimensional  
 (1) What is WKB approximation? Discuss about  
**4. (a) attempt any one** (12)

- (2) Explain removal of degeneracy for double  
 degenerate energy level via Perturbation theory.

$$H = \frac{p^2}{2m} + \frac{mw^2x^2}{2} + \lambda x^4$$

- oscillator having Hamiltonian  
 (1) Obtain the energy eigen values for an harmonic  
**(b) Attempt any one** (6)

- atoms via perturbation theory.  
 (2) Derive the ground state energy for the two-electron  
 wave functions for the isotropic harmonic oscillator.  
 (1) Give the difference between isotropic and  
 anisotropic oscillator. Obtain the normalized radial

- 3. (a) Attempt any one** (12)

- (2) Discuss about Green Functions.  
 (1) Write note on Dirac Delta function.  
**(b) Attempt any one** (5)





\* 0 H K - 7 3 2 2 \*

CHK-7322

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Physics : Paper - CPH - 403

(Computer) (Old Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions :

- (1) Figures on RHS indicate marks.
- (2) The symbols have their usual meaning.

1 (a) Answer any one of the following questions : 8

(1) Write note on MS PowerPoint.

(2) How is it possible to set hyper link in any

slide to start some audio song ?

(b) Answer any two of the following questions : 8

(1) What is blank presentation in PowerPoint

slide ?

(2) Explain briefly : Window and its uses.

(3) Create three slides to present yourself

and your education. (No need to present

actual information).

(c) Answer any one of the following questions : 2

(1) What is control panel ?

(2) Write steps to put slides of date, time

presentation in very brief.

CHK-7322]

1

[Contd...



- 2 (a) Answer any one of the following questions : 7
- (1) Explain any three options of file menu.
  - (2) Explain two different methods to copy some text in same documents.
- (b) Answer any two of the following questions : 8
- (1) What is use of Header and Footer in MS Word ?
  - (2) Write steps to insert symbol in documents.
  - (3) Discuss spelling and grammar checking for word file.
- (c) Answer any one of the following questions : 2
- (1) Discuss about clipart.
  - (2) What is word processing ?
- 3 (a) Answer any one of the following questions : 8
- (1) Write down note on MS Excel and give any one application of it.
  - (2) Explain average function and count function in MS Excel.
- (b) Answer any two of the following questions : 8
- (1) Explain sum function in MS Excel.
  - (2) Explain in detail about mathematical calculations for Microsoft Excel.
  - (3) Discuss manipulating data for MS Excel.
- (c) Answer any one of the following questions : 2
- (1) Explain "IF" function in MS Excel.
  - (2) Explain the formatting "tool bar" in very brief.

- 4
- (a) Answer any one of the following questions : 7
- (1) Explain LAN, MAN, WAN.
  - (2) Write down short notes on E-mail.
- (b) Answer any two of the following questions : 8
- (1) Explain difference between internet and intranet.
  - (2) Write down short note on computer virus.
  - (3) Explain ISP.
- (c) Answer any one of the following questions : 2
- (1) Write down a short note on internet surfing.
  - (2) Write down short note on search engine.



CHK-7331-7343-7344 Seat No.

M. Sc. (Sem. I) Examination

November - 2019

Physics

(1) EPH - 401 : (Electronic Communication)

(2) EPH - 402 (Space Physics)

(Old Course)

(3) EPH - 403 : Applications of Computer in

Physics

Time : 2 Hours]

[Total Marks : 50

Instructions : (1) Figures on R.H.S. indicate individual

marks.

(2) The symbols have their usual

meanings.

1 (A) Answer any **one** of the following : 10

(1) Define primary line parameters, obtain

voltage and current relation with

distance from sending end on

radiofrequency transmission line.

(2) Starting with Maxwell's equations derive

all the equations, describing the

propagation of an electromagnetic wave

in TE mode in a hollow rectangular

wave guide.

6 (B) Answer any **one** of the following:

(1) For a radio frequency transmission line

obtain formula for velocity of propagation

and line wave length in terms of primary

line constants.

- (2) What do you mean by characteristic impedance of a transmission line? Explain why you would expect an infinitely long uniform line to have an input impedance equal to the characteristics impedance.
- (2) Answer any **one** of the following:
- (1) Calculate characteristics impedance, propagation constant at 400 kcs for a transmission line having inductance of  $0.5 \text{ mH/km}$  and capacitance of  $0.08 \mu\text{F/km}$  and negligible R and G.
- (2) Determine the cutoff wavelength for the  $\text{TE}_{10}$  mode in a rectangular waveguide of breadth 10 cms for 2.5 GHz signal propagated in this waveguide in  $\text{TE}_{10}$  mode, calculate the guide wavelength and the phase velocity.
- 2 (A) Answer any **one** of the following:
- (1) Write a detailed note on FSK transmitter and FSK receiver.
- (2) Discuss in detail about satellite system link models.
- (B) Answer any **one** of the following:
- (1) Discuss digital amplitude modulation.
- (2) Write a note on look angles.
- 6
- 10
- 4



- (C) Answer any one of the following:
- (1) An X-band transponder of a geosynchronous satellite at a height of 35,760 km from the surface of the earth and operating at 7.6 GHz has its antenna oriented toward earth station antenna. The input power and directive gain of the transponder antenna are 18 watts and 36 dB respectively. Assuming no losses occurring in the downlink, determine
- (i) Power received by the earth station antenna of aperture diameter and efficiency given as 3 meters and 62% respectively.
- (ii) EIRP of the transponder antenna.
- (2) Explain what is meant by geostationary orbit and why there is only one such orbit.

10

3

- Answer any five from following :
- (1) Define short circuited line.
- (2) Define VSWR. What are the minimum and maximum values of VSWR?
- (3) What are the advantages of waveguide over co-axial line?
- (4) Define apogee and perigee.
- (5) Explain the term "information capacity".
- (6) Define Carrier-to-Noise Density Ratio.
- (7) Define bit energy.



(2) EPH - 402 (Space Physics)

(Old Course)

Instructions : (1) Figures on R.H.S. indicate individual marks.  
(2) The symbols have their usual meanings.

1 (A) Attempt any one : 10

- (i) Describe composition of earth's atmosphere in detail.
- (ii) What is ionosphere? Discuss the photochemical processes.

(B) Attempt any one : 6

- (i) Write short note Chapman's theory of photoionization.
- (ii) Discuss the production of ionospheric layers.

(C) Attempt any one 4

- (i) Discuss thermodynamic consideration of earth's atmosphere.
- (ii) Discuss the importance of ionosphere.

2 (A) Attempt any one : 10

- (i) What is Magnetosphere? Discuss its importance.
- (ii) Describe 'Aurora' in detail.

- (7) What is the difference between Aurora and Airglow ?
- (6) What is thermosphere ?
- (5) Mention the main two constituents of earth atmosphere.
- (4) What are the main layers of atmosphere ?
- (3) List the unique features of earth atmosphere.
- (2) What causes airglow ?
- (1) What is tail current in earth magnetic field ?
- 3 Attempt any five :
- (ii) Explain plasma sphere and its dynamics
- (i) Discuss the applications of Airglow measurements.
- 4 (C) Attempt any one :
- (ii) Describe the causes of magnetosphere in atmosphere ? Discuss in detail.
- (i) What are different types of Airglows
- 6 (B) Attempt any one :

(3) EPH - 403 : Applications of Computer in Physics

Instructions : (1) Figures on R.H.S. indicate individual marks.  
(2) The symbols have their usual meanings.

1 (A) Answer any two of the following : 10

(a) Write input and expected output statements to calculate  $\frac{d}{dx}(\tan^{-1} x)$  and

$$\frac{d}{dx}(x^4 + 25x^2 + 24)$$

(b) If one object is travelling 100 meter in

5 second then calculate its velocity using

mathematica. Give all input and output

statements.

(c) Explain with necessary steps to execute

a program to calculate  $(x+1)^2$  in

software mathematica.

6 (B) Answer the following : (Any One)

(a) Explain how to print the odd terms of

$$\sum_{i=1}^7 \frac{x^i}{i}$$

(b) What is the difference between exact

and approximate result, explain it with

example  $3 \times 3 \times 3 \times 3 \times \dots \times 10$  times or

any other exam ple. (no need to calculate

true result)

- (a)  $f(i) = \sin\left(\frac{i}{5}\right)$  for  $i = 0, 1, 2, \dots, 4$   
 (b)  $f(i) = 2i$  for  $i = 1, 2, \dots, 5$
- (Attempt any one of following.)
- 4 (C) Write instructions to obtain table of following functions for mathematics.  
 (b) Write short note on tables.  
 (a) Write short note on plotting of various graphs.
- 6 (B) Write short notes on : (Any One)  
 (a) Write short note on plotting of various graphs.

- 10 (A) Answer any one of the following :
- (i) Write the suitable instructions in mathematics to display the table with contents 1, 4, 9, 16, 25, 36, 49, 64 and 81.
- (ii) Write necessary instructions in mathematics to Construct the matrix A.
- where  $A = \begin{pmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{pmatrix}$ . Print transpose of A.

- 4 (C) Write input statements to perform the following calculations in mathematics.  
 (Attempt any two of following.)
- (a)  $12 \times 13 \times 11.7 / 6.50$   
 (b)  $(30 + 14)^2 + (3.8 + 3.7)^3 + (1.5)^3$   
 (c)  $2.4 \times 5.6^7$

3 Answer the following : (Any Five) 10

- (1) Write two applications of mathematics.  
 (2) What will be output if input is  $In[1] = e = Expand[2 + 2x + 4\sqrt{2}]$ .

- (3) If input is  $Sqrt[7]$  then output will be \_\_\_\_\_  
 (4) What will be output if input is  $In[1] = Sqrt[1 + x] \sqrt{64}$ .

- (5) The shortcut to exit from mathematica is \_\_\_\_\_  
 (6) What will be output if input is  $In[3] = D[x^n, \{x, 2\}]$ .

- (7) To find the exponential function of  $x$  the is \_\_\_\_\_ used.





- 6 Answer any four of the following questions :  
 (a) Write the stages of Mitosis. 7  
 (b) Define : PCD 2  
 (c) Define : G-protein 2  
 (d) Define : Cancer 1  
 (e) Write the types of Cancer. 2  
 (f) What is Oncogenes. 1
- 5 Answer any one of the following questions : 14  
 (a) Describe : Cancer treatment  
 (b) Describe : Virus-induced cancer.
- 4 Answer any one of the following questions : 14  
 (a) Describe : Cell Cycle  
 (b) Describe : Cell Singaling
- 3 Answer any four of the following questions : 7  
 (a) Write the name of plastids. 2  
 (b) Draw the diagram of Ribosomes. 2  
 (c) Who gave the name of Golgibodies. 1  
 (d) Define : Nuclear pore 2  
 (e) Write in short on cell fixation and staining. 2  
 (f) Define : B-chromosomes. 1

SECTION - II



CHJ-7210

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Botany : BOT - CC - 102

(Molecular Biology & Genetics)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions :

- (1) The are total six (6) questions in this question paper.
- (2) All questions are compulsory.
- (3) In each section first two questions are each of 14 marks.
- (4) Figures to the right indicate marks of question.
- (5) Write each section in separate answer books.

SECTION - I

- 1 Describe or discuss in detail : (Attempt any two) 14
- (1) Double helical structure of DNA given by Waston and Crick.
  - (2) Enzymes involved and their role in Replication.
  - (3) t-RNA structure and its role in protein synthesis.

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1

[Contd...

- 5 Describe or discuss in detail : (Attempt any two) 14
- (1) Spontaneous and induced mutation.
  - (2) Molecular basis of gene mutation.
  - (3) Factors affecting gene frequency.
  - (4) Transposable elements in Prokaryotes.
- 4 Describe or discuss in detail : (Attempt any two) 14
- (1) Cistron recon and muton and their role.
  - (2) Properties of genetic code.
  - (3) Male sterility in plants.
- SECTION - II**
- 3 Give answers in brief : (Attempt any seven) 7
- (1) Write the types of RNA
  - (2) Role of polymerases
  - (3) Define : Translation
  - (4) Explain : Transcription
  - (5) Application of proteomics
  - (6) Function of restriction enzymes.
  - (7) Mention the different kinds of cloning vectors
  - (8) Factors affect Restriction enzyme activity.
  - (9) Write full form of pBR322.
  - (10) Write names of main types of DNA sequencing.
- 2 Describe or discuss in detail : (Attempt any two) 14
- (1) Regulation of gene expression in Prokaryotes.
  - (2) c-DNA libraries.
  - (3) Polymerase chain reaction.

6 Give answers in brief : (Attempt any seven)

7

- (1) What is Allelomorphism ?
- (2) Define : Genetic code.
- (3) What are split genes ?
- (4) Give example of overlapping genes.
- (5) Explain : linkage map.
- (6) What are mutagens ?
- (7) Write names of any three physical mutagens.
- (8) Write names of any two chemical mutagens.
- (9) Explain : Natural Selection.
- (10) Explain : Hardy - Weinberg genetic equilibrium.





CHJ-7218

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Botany : BOT CC - 103

(Biodiversity & Ecology) (New Course)

Time :  $2\frac{1}{2}$  Hours] [Total Marks : 70

Instructions : (1) There shall be two section in the question paper, each of 35 marks.

(2) Write each section in separate answer sheet.

(3) There shall be two questions of 14 marks and one question of 7 marks.

(4) Illustrate your answers with necessary diagrams, if required.

SECTION - I

1 Attempt any two out of three : 14

(1) Discuss on : Biodiversity.

(2) Explain : Hotspots.

(3) Describe : Endemism.

2 Attempt any two out of three : 14

(1) Explain in short: Biogeography.

(2) Write in short : National parks of Gujarat.

(3) Discuss on : Ecological services.

CHJ-7218]

1

[ Contd...

- 3 Attempt any **seven** out of ten :
- (1) What do you mean by phytoplankton ?
  - (2) Define : ecological niche.
  - (3) Write the name of first step consumers.
  - (4) Explain the word : food chain.
  - (5) Define : community dynamics.
  - (6) Explain in brief : R selection.
  - (7) What is the meaning of succession ?
  - (8) Define : mortality.
  - (9) What is an example of genetic variation ?
  - (10) Define : Omnivorous.
- 7
- 2 Attempt any **two** out of three :
- (1) Describe : population growth curve.
  - (2) Explain : speciation.
  - (3) Discuss on : metapopulation.
- 14
- 1 Attempt any **two** out of three :
- (1) Describe : ecosystem.
  - (2) Explain : trophic levels of ecosystem.
  - (3) Discuss on : xerosere.
- 14

SECTION - II

- 3 Attempt any **seven** out of ten :
- (1) Write the full form of WWF.
  - (2) Define : Conservation.
  - (3) Give the names of two rich biodiversitcal zones of India.
  - (4) Define : Genetic diversity.
  - (5) State any two examples of *ex-situ* conservation.
  - (6) Explain the word: biosphere reserve area.
  - (7) What is the meaning of sanctuary ?
  - (8) Define : red data bank.
  - (9) State any two levels of biodiversity.
  - (10) When was National Biodiversity Act enacted in India ?
- 7



CHJ-7226

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination  
November - 2019  
BOTCC - 104 : Plant Taxonomy &  
Resources Utilization  
(New Course)

[Total Marks : 70

Time :  $2\frac{1}{2}$  Hours]

Instructions : (1) All questions are Compulsory and internal choice is provided.

(2) There shall be two sections in the question papers, each of 35 Marks.

(3) Write each section in separate answer sheet.

(4) Illustrate your answers with necessary diagram, if required.

### SECTION - I

1 Attempt any two out of three : 14

- (i) ICBN:- Typification.
- (ii) Taxonomic evidence: Palynology.
- (iii) Merits of Bantham and Hookers classification.

2 Attempt any two out of three : 14

- (i) General characters of family: Meliaceae.
- (ii) Differences of Poaceae and Eyperaceae.
- (iii) Give classification with reason of family salvadoraceae.

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I

[ Contd...

- 6 Answer any **seven** out of ten :
- (i) Which plant use as adulteration in groundnut oil ?
  - (ii) Which types of oil better for potato cultivation ?
  - (iii) Uses of turmeric.
  - (iv) Which plants use as forage crops ?
  - (v) Give uses of cotton fibers.
  - (vi) Uses of tectona grandis timber.
  - (vii) From, which plants we obtain rubber.
  - (viii) Give family of papaver somniferum.
  - (ix) Give full form of NBPGR.
  - (x) Two uses of Aloe vera.

7

- 5 Answer any **two** out of three :
- (i) Describe timber yielding plant: Acacia nilotica.
  - (ii) Plantation and Production of Rubber.
  - (iii) Botanical survey of India.

14

- 4 Attempt any **two** out of three :
- (i) Describe Cereals.
  - (ii) Cultivation and uses of groundnut
  - (iii) General account of saffron.

14

**SECTION - II**

- 3 Answer any **seven** out of ten :
- (i) What is the reason for rejection of name by ICBN ?
  - (ii) Give standard size of Herbarium sheet.
  - (iii) Who gives natural classification system ?
  - (iv) Who wrote "Flora of Gujarat" ?
  - (v) Who wrote "Flora of Bombay presidency ?
  - (vi) Give two botanical names of family Rutaceae.
  - (vii) Give characters of series disciflorae.
  - (viii) Give characters of class Monocotyledons.
  - (ix) Botanical name of Jalpatti.
  - (x) What is Peranth ?

7





CHK-7302

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Botany : CBO - 401

(Bacteriology, Phycology, Mycology & Plant Pathology)

(Old Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions : (1) The question paper consists of two

sections, each has three questions.

(2) All questions are compulsory and

internal choice is provided.

(3) Write each section in separate answer

sheet.

(4) Illustrate your answers with necessary

diagrams.

### SECTION - I

1 Answer the following : (two out of three) 14

(i) Give briefly structure of Bacterial cell.

(ii) Describe nutrition pattern in Bacteria.

(iii) Write note on Economic importance of

bacteria.

2 Answer any three out of five each of 05, 05 14

and 04 marks :

(i) Write general characteristics of Rhodophyta.

(ii) Describe the thallus organization found in

Chlorophyta.

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1

[ Contd...



- 5 Answer any **three** out of five :
- (i) Write briefly general symptoms of plant diseases.
  - (ii) Write causal organism and disease cycle of Smut.
  - (iii) Write note on causal organism, symptoms and disease cycle of downy mildew.
- 14
- 4 Answer any **two** out of three :
- (i) Explain the general characteristics of Phycomycetes.
  - (ii) Write the classification of Fungi.
  - (iii) Give the economic importance of Fungi.
- 14

**SECTION - II**

- 3 Answer any **four** out of six each of 02, 02, 02 and 01 marks :
- (i) Give difference between gram positive and gram negative bacteria.
  - (ii) Write a note on bacterial conjugation.
  - (iii) What is isomorphic life cycle?
  - (iv) Give the name of dominant pigment found in red and brown algae.
  - (v) What is heteromorphic life cycle?
  - (vi) Give the name of male and female sex organ in Chara.
- 7
- (iii) Mention uses of algae as food and fodder.
- (iv) Explain the Sexual reproduction in Algae.
- (v) Give economic importance of Pheophyta.

- 6 Answer any **four** out of six each of 02, 02, 02 and 01 marks :
- (i) Write characteristics of Ascomycetes.
  - (ii) Explain the Reproduction in Deutromycetes.
  - (iii) What are deutromycetes?
  - (iv) What are the symptoms of rust diseases?
  - (v) Name types of spores found in rust diseases.
  - (vi) State the diseases symptoms of late blight of paddy.
- 7
- (iv) Give the classification of plant diseases.
  - (v) Write a note on Bacterial blight of paddy.



CHK-7320 Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Botany : CBO - 403

(Cell Biology & Genetics)

(Old Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions : (1) The question paper consists of two

sections; each has three questions.

(2) All questions are compulsory and

internal choice is provided.

(3) Write each section in separate answer

sheet.

(4) Illustrate your answers with necessary

diagrams.

SECTION - I

1 Answer the following : (two out of three) 14

(i) Describe the Ultrastructure of Nucleus.

(ii) Explain the structure and function of

Chloroplast.

(iii) Give an account of meiosis cell division.

2 Answer any three out of five each of 05, 05 14

and 04 marks :

(i) Write a note on extra chromosomal inheritance

in mitochondria.

(ii) Write in short : gene interactions.

(iii) Discuss on male sterility.

(iv) Write a note on non chromosomal genes in

chlamydomonas.

(v) Write note on petite in yeast.

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1

[ Contd...

- 3 Answer any **four** out of six each of 02, 02, 02 and 01 marks :  
7
- (i) Write two functions of Lysosomes.
  - (ii) What is Nuclear membrane pore complex?
  - (iii) Give importance of lampbrush chromosome.
  - (iv) Write functions of plasma membrane.
  - (v) Define : Epistasis
  - (vi) Give examples of any two mitochondrial inheritances.
- 4 Answer any **two** out of three :  
14
- (i) Write note on chromosomal mapping.
  - (ii) Explain molecular basis of mutation.
  - (iii) Discuss briefly on proto-oncogenes and cellular oncogenes.
- 5 Answer any **three** out of five :  
14
- (i) Describe law of segregation.
  - (ii) Write note on Hardy Weinberg equilibrium.
  - (iii) Give the importance of natural selection.
  - (iv) Write a note on genetic polymorphism.
  - (v) Give a brief account of Genetic drift.
- 6 Answer any **four** out of six each of 02, 02, 02 and 01 marks :  
7
- (i) What is spontaneous and induced mutation?
  - (ii) Name two chemical mutagens.
  - (iii) Explain the word : AC-DS system.
  - (iv) Define transposons.
  - (v) What is split genes ?
  - (vi) Define codominant alleles.

## SECTION - II







- (1) Conservation of Biodiversity
- (2) Role of educational institute in Biodiversity conservation.
- (3) In-situ conservation of Biodiversity.

3 (a) Describe / Discuss in detail : (attempt any two) 10

SECTION - II

- (1) Invasive plants found in your area.
- (2) What is species extinction ?
- (3) Scientific names of medicinal plants.
- (4) Name the plants used as forage.
- (5) Major constituents of cereals.
- (6) Write full form of CBD.
- (7) Mention name of plants yield oil.

2 Answer the following : (attempt any five) 5

- (1) Define : Intellectual Property Right and its role.
  - (2) Define : Biodiversity as per CBD.
  - (3) Significance of ornamental plants.
  - (4) Endangered and threatened biodiversity.
- (c) Write short answer : (attempt any two) 4

- (b) Write short notes on : (Attempt any two) 6
- (1) Biopiracy
  - (2) Laws of Biodiversity
  - (3) Role of indigenous knowledge in bio prospecting
  - (4) Ecosystem diversity.
- (c) Write answers in brief : (attempt any two) 4
- (1) IUCN and its role in conservation.
  - (2) Role of IPR in Biodiversity conservation
  - (3) What is UNEP ? And its role in biodiversity management.
  - (4) convention on Biodiversity.
- 4 Give answer in brief : (attempt any five) 5
- (1) What are RET species ?
  - (2) Explain : Ex-situ conservation.
  - (3) Write full form of JFM and its role in conservation.
  - (4) Write full name of UNESCO.
  - (5) Significance of Red Date Book.
  - (6) Write names of National Parks of Gujarat.
  - (7) Write names of Sanctuaries (wildlife) in North Gujarat.

- I
- Answer the following :
- (A) Answer any two out of three :
- (1) Explain the wind factors.
- (2) Write note on energy flow in ecosystem.
- (3) Describe briefly phosphorous cycle.
- (B) Answer any two out of four :
- (1) Write brief note on population and growth density.
- (2) Discuss on ecological niche.
- (3) Write short note on effect of fire on plants.
- (4) Give various types of ecosystem.
- (C) Answer any two out of four :
- (1) Give the structure and function of Ecosystem.
- (2) Give importance of Nitrogen cycle.
- (3) Write a note on synecology.
- (4) Write a note on Mortality.
- 4
- 6
- 10

SECTION - I

- Instructions :
- (1) The question paper consists of two sections, each has three questions.
- (2) All questions are compulsory and internal choice is provided.
- (3) Write each section in separate answer sheet.
- (4) Illustrate your answers with necessary diagrams.

(2) EBO - 402  
(Environmental Biology)  
(Elective) (Old Course)

- 2 Answer the following five out of seven :
- (1) What is Natalty?
  - (2) Define the word biogeochemical cycle.
  - (3) Write on Raunkier's life forms.
  - (4) Define the biotic and abiotic factor
  - (5) Name two methods of plant community identifications.
  - (6) Define the term ecotypes.
  - (7) Name the two abiotic factors affecting environments.
- 1 Answer the following :
- (A) Answer any two out of three :
- (1) Describe effect of green house gases.
  - (2) Write note on plants as indicators.
  - (3) Write on wild life sanctuaries in India.
- (B) Answer any two out of four :
- (1) Write general account of major biomes of the world.
  - (2) Write notes on guiding principles for environmental education.
  - (3) Explain the forest research work in India.
  - (4) Explain that Ozone layer as an earth protected umbrella.
- (C) Answer any two out of four :
- (1) Write note on goals of environmental education.
  - (2) Give the disadvantages of acid rain.
  - (3) Explain the various flora of India.
  - (4) Describe briefly endangered Species of IUCN categories.
- 4
- 6
- 10

SECTION - II

- 2 Answer the following five out of seven :
- (1) What is Natalty?
  - (2) Define the word biogeochemical cycle.
  - (3) Write on Raunkier's life forms.
  - (4) Define the biotic and abiotic factor
  - (5) Name two methods of plant community identifications.
  - (6) Define the term ecotypes.
  - (7) Name the two abiotic factors affecting environments.
- 5



- 1 Answer the following :
- (A) Answer any two out of three :
- (1) Describe propagation advantages.
- (2) Discuss on green house and write its advantages.
- (3) Explain dormancy.
- (B) Answer any two out of four :
- (1) Describe the various methods of preservation.
- (2) Write a note on packaging of horticultural products.
- 6
- 10

SECTION - I

- Instructions : (1) The question paper consist of two sections, each has two questions. (2) All questions are compulsory. (3) Write answer of each section in separate answer sheet. (4) Illustrate your answers with necessary diagram, if required.

(Old Course)

(3) EBO - 403 : Horticulture

- 2 Answer the following five out of seven :
- (1) Define the term Pollutant and Pollution.
- (2) What is Ozone layer ?
- (3) Name two toxic chemicals causing environmental pollution.
- (4) Define Ex situ and In situ conservation.
- (5) What are IUCN categories ?
- (6) Give two objectives of environmental education.
- (7) Define the term Phytogeography.
- 5



- 6 (B) (1) Write notes on propagation by specialized stem and roots.  
 (2) Discuss on the stock and scion.  
 (3) Explain various techniques of grafting.  
 (4) Answer any two out of four :  
 (A) Describe the anatomical aspects of propagation by cutting.  
 (B) Explain the anatomical aspects of propagation by cutting.  
 (C) Answer any two out of three :

SECTION - II

- 10 (A) (1) Write two advantages of vegetative propagation.  
 (2) Explain the word: kitchen garden.  
 (3) State any two factors that affect seed germination.  
 (4) Explain the main two importance of horticulture.  
 (5) Answer the following five out of seven :  
 (6) Mention the horticultural crops of Gujarat.  
 (7) Give the various types of green houses. (name only)  
 (8) Write two advantages of vegetative propagation.  
 (9) Explain the word: kitchen garden.  
 (10) State any two factors that affect seed germination.  
 (11) Explain the main two importance of horticulture.  
 (12) Answer the following five out of seven :

- 5 (A) (1) Explain in brief: horticulture as a science and art.  
 (2) What is floriculture?  
 (3) What do you mean by broadcasting?  
 (4) What are ways to overcome seed dormancy?  
 (5) Write in short : seeding vigour  
 (6) Explain: effect of PGRs on seed germination  
 (7) Answer any two out of four :  
 (8) Explain in brief: horticulture as a science and art.  
 (9) What is floriculture?  
 (10) What do you mean by broadcasting?  
 (11) What are ways to overcome seed dormancy?  
 (12) Answer any two out of four :

- 2
- Answer the following five out of seven :
- (1) What is T-budding?
  - (2) Write any two patterns of gardening.
  - (3) Explain the word potting.
  - (4) Name two propagations by stem.
  - (5) Describe the use of tubers for propagating plants.
  - (6) Explain two advantages of grafting.
  - (7) Name the causal organism for tristeza bud disease of orange.

- 4
- (C) Answer any two out of four :
- (1) Describe pathogen induced incompatibility.
  - (2) Write on propagation by rhizomes.
  - (3) Name of two anatomical flows leading to incompatibility.
  - (4) Repair grafting

- (2) Explain air layering.
- (3) Write on technique of budding.
- (4) Explain in short: factor affecting on cutting.



CHK-7311

M. Sc. (Part - I) (Sem. I) Examination

November - 2019

Bryophytes, Pteridophytes, Gymnosperms  
Fossils : Paper CBO - 402  
(CC) (Old Course)

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instructions :

- (1) There are two sections in this questions paper. Both are compulsory and carry equal marks.
- (2) Write answers of Section-I and Section-II in separate answer books.
- (3) Give your answers with neat and labelled diagrams whenever required.

### SECTION - I

- 1 Answer any two of the following questions : 14
- (1) Write General characters of Bryophytes.
  - (2) Explain reduction theory of the evolution of the sporophytes in Bryophytes.
  - (3) Write Economic importance of Bryophytes.
- 2 Answer any three of the following questions : 14
- (1) Write on Stellar evolution.
  - (2) Write general characters of Pteridophytes.
- CHK-7311] 1 [Contd...

- (3) Structure of spermatozoid in Lycopodium and Isoetes. 5
- (4) Write on Heterospory. 4
- (5) Write on types of Protostele. 4
- 3 Answer any four of the following questions : 7
- (1) Define : Bryophytes. 2
- (2) Structure and origin : Columella in Anthoceros. 2
- (3) Give only name of the class of bryophytes which does not possess elaters. 1
- (4) Define : Stele. 2
- (5) Write the function of Inducium. 2
- (6) Define : Eusporangiate. 1
- 4 Answer any two of the following questions : 14
- (1) Write general characters of Gymnosperms. 5
- (2) Write comparative account of Coniferales and Ephedrales. 5
- (3) Write classification of Gymnosperms. 4

- 5 Answer any three of the following questions : 14
- (1) Describe : Geological Time - Scale. 5
  - (2) Describe : Nomenclature of fossils. 5
  - (3) Describe : Petrification and Compression. 5
  - (4) Describe : Sporangium in Rhynia. 4
  - (5) Write note on : Asteroxylon. 4
- 3 Answer any four of the following questions : 7
- (1) Define : Gymnosperms. 2
  - (2) Give the two species name of Cycas. 2
  - (3) Give the name of the genus having circinate vernation in leaves. 1
  - (4) Define : Fossil 2
  - (5) Give the classification of Rhynia. 2
  - (6) Write diagnostic characters of cordaitales. 1





CHJ-7236-37-38

Seat No. \_\_\_\_\_

M. Sc. (Sem. I) Examination

November - 2019

Botany

(1) Environmental Science : BOT EC - 101

(2) Bio-Fertilizer Technology : BOT EC - 102

(3) Herbal Medicine / Science : BOT EC - 103

(New Course)

Time : 2 Hours]

[Total Marks : 35

(1) Environmental Science : BOT EC - 101

(New Course)

Instructions : (1) There are three questions in this

question paper.

(2) Figures to the right indicate marks of

questions.

(3) Give your answers with neat and

labeled diagram wherever required.

1

Answer any three of the following questions : 15

(a) Write short notes on types of Ecosystem.

(b) Write short notes on Nataliy.

(c) Write on phytosociological characters of plant

community.

(d) Write on nitrogen cycles.

2

Answer any three of the following questions : 15

(a) Write on Goals and Objectives of

Environmental Education.

(b) Write on Major biomes of the world.

(c) Write on Wild Life Sanctuaries in India.

(d) Write on Green house gases.

- 3 Answer any **three** of the following questions :
- (a) Define : Ecotype. 5
  - (b) Write on Environmental Science and its objective. 2
  - (c) Define : Ozone layer. 2
  - (d) Define : Endangered Species (IUCN Categories). 2
  - (e) Define : Pollution. 1
  - (f) Define : Productivity. 1

**(2) Bio-Fertilizer Technology : BOT EC - 102 (New Course)**

Instructions : (1) All questions are compulsory. (2)  
 There shall be two questions of 12 marks and 1 question of 11 marks. (3)  
 Illustrate your answers with necessary diagram, if required.

- 1 (a) Attempt any **one** out of two. 6

- (1) Describes : Characters of bio fertilizer.
- (2) Write note on : Types of bio fertilizer.

- (b) Attempt any **two** out of three : 6
- (1) Explain : Regulation of nitrogen fixation.
  - (2) Write short note : Phosphate solubilizing microorganisms.
  - (3) Describes : Hydrogenase.

- 2 (a) Attempt any **one** out of two : 6
- (1) Describes : Mass production of various bio fertilizer.
  - (2) Explain in short : Agronomical significance of bio fertilizer.

- (b) Attempt any **two** out of three : 6
- (1) Write short note : Promotion and marketing in bio fertilizer.
  - (2) Explain : Fermentation.
  - (3) Describes : Application of bio fertilizer in field.

SHATAVARI

- (3) Describe: Therapeutic value of
  - (2) Write the types of secondary metabolites in human welfare.
  - (1) Explain in short: Uses of herbal plant
- 6 (b) Attempt any **two** out of three :
- (2) Write notes on : Diagnostic features and therapeutic value of BRAHMI.
  - (1) Describe : function of secondary metabolites.
- 6 (a) Attempt any **one** out of two.

- (3) Illustrate your answers with necessary diagram, if required.
- (2) There shall be two questions of 12 marks and 1 question of 11 marks.
- (1) All questions are compulsory.

Instructions :

(New Course)

(3) Herbal Medicine / Science : BOT EC - 103

- (8) Write an advantage of bio fertilizer.
  - (7) Which nitrogen fixing symbiotic organism present in Azolla.
  - (6) Which bio fertilizer present in the legumes ?
  - (5) What are essential steps to make bio fertilizer ?
  - (4) State the importance of Azospirillum.
  - (3) Give any two names of bio fertilizer.
  - (2) Define : Enzyme.
  - (1) Write the name of nitrogen fixing blue green algae.
- 5 (b) Attempt any **five** out of eight.
- (5) Describes in short : Azotobactor.
  - (4) Write the importance of bio fertilizer.
  - (3) Write in short : Extension strategies.
  - (2) Describes in short : Strain selection.
  - (1) Define : bio fertilizer.
- 6 (a) Attempt any **three** out of five.



- 2 (a) Attempt any **one** out of two : 6
- (1) What are the various biotechnological methods for the secondary metabolites ?
- (2) Explain in short : HPLC.
- (b) Attempt any **two** out of three : 6
- (1) Write short note : Bio prospecting of medicinal plants.
- (2) Explain in short : Genetic marker.
- (3) Describe: DNA finger printing for production of medicinal plants.
- 3 (a) Attempt any **three** out of five. 6
- (1) Explain: Biopiracy.
- (2) Write the botanical name of GUGAL and SHATAVARI.
- (3) State any two therapeutic value of ASHVAGANDHA
- (4) Write in short : Protection of medicinal plants.
- (5) Explain in brief : Herbal products.
- (b) Attempt any **five** out of eight. 5
- (1) Name the different types of chromatography.
- (2) Write the two functions of Steroids
- (3) Mention the scientific name of TULSI.
- (4) The genus ALOE is member of the family \_\_\_\_\_
- (5) Write the full form of HPTLC.
- (6) Write the Botanical name of MUSLI.
- (7) SARPAGANDHA is belongs to family \_\_\_\_\_
- (8) Write the full form of IPR.