MAV-3456 Seat No._____

M. Sc. (Sem. III) Examination

October / November - 2018

CPH - 601 : Statistical Mechanics & Nuclear Physics

(New Course)

Time : **3** Hours] [Total Marks : **70**

Instructions : (1) Symbols used have usual meaning.
(2) Figure to the right indicates marks of the question.

1 (a) Attempt any **two** : **10**

(1) What is ensemble ? State and prove Ergodic hypothesis.

(2) Explain Density of phase point discuss Liouville's theorem in classical mechanics.

(3) Explain density distribution of phase space.

(b) Attempt any **one** : **4**

(1) Explain condition for statistical equilibrium.

(2) Discuss Liouville's theorem in quantum statistical mechanics.

2 (a) Attempt any **two** : **10**

(1) Discuss photo electric effect and obtain formula for current density.

(2) Explain Bose – Einstein condensation.

(3) Obtain Einstein relation for mobility.

(b) Attempt any **one** : 4

(1) Obtain formula for compressibility of Fermi Gas.

(2) Discuss Einstein's derivation of Plank's law.

3 (a) Attempt any **two** : 10

(1) Discuss Breit Wigner Dispersion formula for l=0.

(2) Discuss ground state of the Deutron.

(3) Describe effective range theory in n-p scattering.

(b) Attempt any **one** : 4

(1) Discuss scattering length. Explain how it is obtained ?

(2) Discuss excited states of deutron.

4 (a) Attempt any **two** : 10

(1) Discuss CPT Theorem.

(2) Describe classification of elementary particles.

(3) Discuss Quark model.

(b) Attempt any **one** : 4

(1) Discuss Isospin.

(2) Explain Baryon number, Lepton number.

5 Attempt any **seven** : 14

(1) What is White Dwarf ?

(2) Which metals are having compressibility close to compressibility of an electron gas.

(3) What is the Chandrasekhar limit ?

(4) What is black body radiation ?

(5) What is the magnitude of emmisivity for perfect black body ?

(6) Write formula for Stefan's constant.

(7) What is hypercharge ?

(8) What is the sign of scattering length when scattering state can be a positive ?

(9) For weak interaction Strangeness is conserved. True or false ?

(10) What is parity ?

MAV-3451 Seat No._____

M. Sc. (Sem. III) Examination

October / November - 2018

Organic Chemistry : CC CH - 601

Time : 3 Hours] [Total Marks : 70

Instruction : All questions carry equal marks.

1 Answer any **two** of the following : **14**

(1) Determine the structure of Anthocynidine.

(2) What are flavones ? Give two methods for the synthesis of flavone.

(3) Write a note on proof of the dihydroporphyrin structure of chlorophyll.

(4) Discuss the occurrence, isolation, and properties of Quercetin and establish its relationship to Cyanidin chloride.

2 Answer any **two** of the following : **14**

(1) Discuss Ruzika's work to confirm the position of carboxylic group and angular methyl group in abietic acid.

(2) What are di and tri terpenes ? Discuss the structure of Gibberillic acid.

(3) Discuss the structure of Phytol.

(4) Discuss the constitution of Cadinine.

3 Answer any **two** of the following : 14

(1) Give evidence for nature, nucleus and side chain in biotin.

(2) Explain in brief: Biological importance of Vitamins.

(3) Describe the structure and synthesis of ascorbic acid.

(4) What are Vitamins ? Discuss their classification and nomenclature.

4 Answer any **three** of the following : 14

(1) Using evidence discuss Hoffman's exhaustive methylation in elucidating the structure of alkaloids.

(2) Why hydrocarbon Yobirine is essential to establish the structure of Reserpic acid.

(3) Discuss the structures of α and β Strychninolonese.

(4) Explain: Nature / size of ring C in Cholchicine.

(5) Discuss the degradative and synthetic evidences leading to the structure of opium alkaloid (Narcotine).

5 Answer any **seven** of the following 14

(1) Explain the deficiency of Vitamin D_2. Which diseases produced ?

(2) How many α and β chains are present in Haemoglobin and What is its end group ?

(3) Draw the structure of chlorophyll.

(4) What is the basic structure unit of Haemin ?

(5) Give structural classification of natural pigments.

(6) What is the relation between Flavanol and xanthone ?

(7) Give synthesis of Polyporic acid.

(8) What is the process to detect isopropyliidene grouping in an unknown terpenoid ?

(9) Give OzonolysisPhytol.

(10) Evidence for presence of a phytyle group in chlorophyll - A

MAV-3462 Seat No. _____

M. Sc. (Sem. III) Examination

October / November - 2018

Organic Chemistry - 2

Time Hours] [Total Marks : 70

Instruction : (1) All questions carry equal marks.
(2) Answers of all questions must be written in same answer book.

1 Answer any **two** : **14**

(1) Write a short note on safety hazards.

(2) Give an account on measures taken to protect against fire and toxic chemicals in the industry.

(3) What is unit process ? Discuss the industrial importance of sulphonation.

2 Answer any **two** : **14**

(1) Write the types of detergents and give brief account on each type.

(2) Write the sources of essential oils. Give the name of any five essential oils. Discuss the general method for isolation of essential oils.

(3) Write a note on "food additives" and "fruit concentrates."

3 Answer any **two** : **14**

(1) Give the manufacturing process of cotton seed oil.

(2) Give account on plant nutrients and plant hormones.

(3) Write the types of insecticides. Write note on fungicides and rodenticides.

4 Answer any **two** : 14

(1) Describe the manufacture of pulp from wood by kraft process.

(2) Discuss the process of manufacturing ethanol from sugar industries.

(3) Give synthesis and use of cimetidine and diazopam.

5 Answer any **seven** : 14

(1) What is the importance of flowchart in industry ?

(2) What types of basic chemical data are required for a chemical process ?

(3) Write some specification for patents.

(4) Give difference between hard soaps and soft soaps with their type of applications.

(5) What are the reagents used for the hydroxylation reaction ?

(6) What is the use of preservatives ? Give names of any two preservatives.

(7) Write the difference between vegetable oil and hydrogenated vegetable oil.

(8) Give the names and uses of any two Agrochemicals.

(9) What is the use of sulfitation process in manufacture of sugar.

(10) Why bleaching is used in the manufacture of paper ?

ABT-2211-12-13 Seat No. 164

M. Sc. (Sem. III) Examination

November / December - 2016

Chemistry : Paper - II

1. CHN - 602 (O) : Organic Chemistry

2. CHN - 602 (I) : Inorganic Chemistry

3. CHN - 602 (P) : Electro Chemistry

(New Course)

Time : 3 Hours] [Total Marks : 70

1. CHN - 602 (O) : Organic Chemistry

Instruction : All questions are compulsory and carry equal marks.

1 Answer any two of the following questions : 14

(1) What is the importance of safety in plant ? What are the precautions to be taken to prevent fire and in use of hazardous chemicals in plant ?

(2) With illustrations, compare batch and continuous processes.

(3) Explain drying and filtration techniques with their industrial importance.

(4) What is unit process ? Give its importance in industrial organic chemistry. Discuss industrial importance of halogenation.

2 Answer any two of the following questions : 14

(1) Give types of detergents. Discuss synthesis and uses of alkyl aryl sulphonate and alkyl sulphonates. 5

(2) Discuss the manufacture of fatty acids and fatty alcohols.

(3) What is fixatives ? Discuss animal fixatives.

(4) Write a note on 'Food Additives' and 'Preservatives'.

3 Answer any three of the following questions : 14

(1) Discuss the method of production and industrial uses of cotton seed oil.

(2) Write a note on plant hormones.

(3) Describe plant nutrients.

(4) Give a detailed account on phosphorous containing insecticides.

(5) Write a note on fungicides and rodenticides.

4 Answer any three of the following questions : 14

(1) Discuss the manufacture of acetate rayon.

(2) Explain the manufacture of paper from pulp.

(3) Give the process of manufacturing of sugar.

(4) Explain carboxylation and acetylation reactions for the manufacturing of salicylic acid derivatives.

(5) Give synthesis and uses of cimetidine and piperizine citrate.

5 Answer any seven of the following questions : 14

(1) What are the reagents used for the hydroxylation reaction ?

(2) Give major differences between unit process and unit operation.

(3) Write some specifications for patents.

(4) Give the structure and uses of monosodium glutamate.

(5) Write any two characteristics of eco-friendly detergent.

(6) Distinguish and give two examples each of drying and non-drying oils.

(7) What is weedicides ? Classify them.

(8) Give reaction for preparation of methoxychlor insecticides.

(9) What is calendering ?

(10) Give structure of phenobarbital and valium.

2. CHN - 602 (I) : Inorganic Chemistry

1 (a) Answer any two questions from the following : 8

(1) Discuss the structure and importance of Myoglobin.

(2) Describe the mechanism of enzyme action in biological system.

(3) Explain : Hemerythrins as Oxygen carrier molecule.

(b) Answer any one question from the following : 6

(1) Write a short note on Iron Sulphur proteins.

(2) Discuss on Ferritin act as iron storage compound.

2 (a) Answer any two questions from the following : 8

(1) Discuss the biological system of Zinc.

(2) Write a short note on Hemocyanins.

(3) Explain biochemistry of Molybdenum.

(b) Answer any one question from the following : 6

(1) Briefly account on biochemistry of Vanadium, chromium and nickel.

(2) Explain biochemistry of Tungsten.

3 (a) Answer any two questions from the following : 8

(1) Explain Reductive Elimination process.

(2) Discuss briefly the role of Organo Metallic Compound in carboxylation reaction.

(3) Write a short note on Migration Reaction.

(b) Answer any one question from the following : 6

7 (1) Discuss in detail of Water Gas Shift reaction

(2) Explain the Fischer Tropes process.

4 (a) Answer any two questions from the following : 8

(1) Write Synthesis, Isotopes, Physical, Chemical properties of Plutonium.

(2) Discuss the chemistry of Americium

(3) Discuss the comparative study between Lanthanide and Actinide.

(b) Answer any one question from the following : 6

(1) Explain chemistry of Neptunium

(2) Write note on Extension of Modern Periodic table.

5 Answer any seven questions from the following : 14

(1) Define Metallo porphyrins

(2) Write a electronic configuration of Cm^{+3} and Gd^{+3}.

(3) Which isotopes of plutonium was used in manhattan project during second world war ? Write any one synthesis reaction of Pu.

(4) How many elements have been discovered recent year ? Write Atomic no. and symbol of them.

(5) Write Allotropes of plutonium.

(6) What is Zeise's salt ?

(7) Define organo metallic compound.

(8) Draw the structure of haemoglobin.

(9) Write colour of trans urenic elements.

(10) What is Bioinorganic chemistry ?

3. CHN - 602 (P) : Electro Chemistry (New Course)

Instructions :

(1) All questions are compulsory.

(2) Figures to the right indicate maximum marks.

(3) Answer the questions accurately and appropriately.

Constants :

$h = 6.625 \times 10^{-34}$ J.S,

$R = 8.314$ J/K mol,

$k_B = 1.38 \times 10^{-23}$ J/K,

$N_A = 6.023 \times 10^{23}$ per mol

1 (a) Answer any two of the following questions : **10**

(1) What is transference number ? Describe an experimental method for determination of ionic mobility.

(2) Elaborate Debye-Falkenhagen effect and Wein effect with illustrations.

(3) Describe the electrolytic dissolution theory of solutions. Discuss influence of solvent on dissolution.

(b) Solve any one of the followings : **4**

(1) At 25°C equivalent conductances of infinitely dilute solutions of HCl, sodium acetate and NaCl are 420, 90 and 120 mho cm^2/equiv. respectively. Calculate equivalent conductance of acetic acid at infinite dilution at the same temperature.

(2) At 25°C the limiting equivalent conductivities of barium and sulphate ions are 63.6 and 79.8 mho cm^2/equiv. If the specific conductivity of saturated barium sulphate solution and ultra pure water at the same temperature are 5.68×10^{-6} and 5.5×10^{-8} mho/cm respectively, what will be solubility of the sparingly soluble barium sulphate salt in the water ?

2 (a) Answer any two of the following questions : **14**

(1) Define the term dissociation constant of an acid. Describe a conductometric method for the determination of dissociation constant of acetic acid.

(2) Write a brief resume on the 'solvents'.

(3) What is amphoteric electrolytes ? Describe an EMF method for determination of dissociation constant of amino acid.

3 Answer any two of the following questions. **14**

(1) Discuss the advantages and limitations of the various theories of hydrogen over voltage.

(2) Elaborate reversible oxidation and reduction process. Describe the applications and factors effecting electrolytic reduction and electrolytic oxidation.

(3) Write a brief resume on 'Polarization'.

4 Answer any two of the following questions : 14

(1) Elaborate the mechanisms of various electrokinetic phenomena.

(2) What is streaming potential ? Derive an equation for streaming potential. Explain the effect of positive ions on zeta-potential with illustration.

(3) Discuss quantum aspects of charge transfer processes in electrode kinetic phenomena.

5 Answer any seven of the following short questions. 14

(1) Arrange the following solvents in their increasing order of polarity : water, ethanol, toluene.

(2) Acid-base is relative property – Justify the statement with examples.

(3) What is iso-electric point of an amino acid ?

(4) Which factors do affect the transport number ?

(5) Which cation has the greatest ionic mobility in water ? Why ?

(6) Define the terms : Decomposition and dissolution potentials.

(7) Rusting is a chemical process – Comment on the statement.

(8) What is the driving force in 'electro-osmosis' ?

(9) What is moving phase in 'electro-phoresis' ?

(10) Compare the zeta potential with streaming potential.

GDF-2621-23-24-25 Seat No._____

M. Sc. (Sem. III) Examination

January - 2016

Chemistry

1. CHN-603(O) : Organic Chemistry
2. CHN-603(I) : Inorganic Chemistry (Corrosion)
3. CHN-603(I) : Inorganic Chemistry (Coordination)
4. CHN-603(P) : Physical Chemistry (Polymer Chemistry)

Time : 3 Hours] [Total Marks : 70

1. CHN-603(O) : Organic Chemistry

Instructions :

(1) Figures shown at right side indicate marks.
(2) Language of answers is English.

1 Answer any two : 14

(a) Give an account on radiopharmaceuticals for Scintigraphy.
(b) Considering : amines, alcohols, phenols, carboxylic acids and heterocyclic moieties, explain their physiological impact.
(c) Write a note on receptor site theory.
(d) Explain the use of solvents and flavours in pharmaceutical preparations.

2 Answer any two : 14

(a) Give an account on amphotericin-B.
(b) Synthesis and uses of cephalosporin-C.
(c) How can you synthesize chloramphenicol ?
(d) Define an antibiotic drug. Give the classification of antibiotics based upon their mode of action.

3 Answer any two : 14

(a) What is dapsone ? Give general structure activity relationships of sulfonamide drugs.

(b) Explain synthesis and uses of sulphalene and sulphamerazine.

(c) Discuss the synthesis and uses of sulphathiazole and sulphafurazole.

4 Answer any two : 14

(a) What is resting potential ? How do local anesthetics affect resting potential ? Explain the related distribution and movement of sodium and potassium.

(b) Give an account on cholinergic drugs with ester group.

(c) Discuss the physiological effects of histamine.

(d) Write a note on amino alkyl ethers as antihistaminic agents.

5 Answer any seven questions in brief : 14

(a) What is the mechanism of action of trimethoprim ?

(b) How can you convert streptomycin to maltol ?

(c) Explain the meaning of H_1 antagonist.

(d) What is C.T. ? Explain.

(e) Discuss the role of acetylcholine in humans.

(f) Describe bioisosterism.

(g) Explain the difference of structure between aureomycin and terramycin.

(h) Explain efficacy and potency.

(i) Give the principles of GC and HPLC.

(j) Explain folic acid metabolism.

(k) Discuss the significance of pK_a of sulfonamide drugs.

(l) Explain, how many are basic types of odours (smell) and which are these ?

2. CHN-603(I) : Inorganic Chemistry (Corrosion)

Instruction : All questions carry equal marks.

1 Answer any two of the following :

(i) What are the different types of corrosion damages? Explain pitting type corrosion.

(ii) Write a note on uniform attack.

(iii) Explain the part of oxygen electrode in the construction of differential aeration cells with illustration.

(iv) Represent Pourbaix diagrams with their utility and limitation.

2 Answer any two of the following :

(i) What is Polarization ? Discuss with suitable example the influence of polarization on the corrosion rate in the acidic solution.

(ii) Explain Hydrogen Over Voltage. Give reasons for decreasing the overvoltage.

(iii) Write a short note on an atmospheric corrosion.

(iv) Explain : Corrosion Product Films.

3 Answer any two of the following :

(i) Discuss Wagner theory of Oxidation.

(ii) Explain the corrosion on underground pipe and discuss the methods for prevention of this corrosion.

(iii) Discuss two types of microorganisms participated in the soil corrosion. How the corrosion of Iron pipe occurred by them can be prevented ?

(iv) Write a short note on Oxidation Resistant Alloys.

4 Answer any two of the following :

(i) Explain methods for making soft water used in boiler.

(ii) Explain the mechanism of corrosion fatigue. How can be prevented ?

(iii) What is stress corrosion cracking ? Explain the mechanism of stress corrosion cracking that occurs on steel and other metals.

(iv) Write a short note on Hydrogen Cracking.

5 Answer any two of the following :

(i) Explain the nature of corrosion in boiler. Describe the effective stop to prevent it.

(ii) Write a short note on Dezincification and its prevention.

(iii) Discuss the factors that encourage intergranular cracking. Describe the steps to decrease it.

(iv) Write a short note on emf series.

3. CHN-603(I) : Inorganic Chemistry (Coordination)

1 Answer any two questions from the following. 14

(a) Discuss the Crystal field splitting diagram for any square planar complex.

(b) Complete the deviation of $V_{(x,y,z)}$ from the expansion of $\frac{1}{r_{ij}}$ showing that contributions from n = 4, m = ±1, ±2 are zero.

(c) Evaluate the $<\Theta_{2,0}\left|V_{oct}\right|\Theta_{2,0}>$ integral.

2 Answer any two questions from the following. 14

(a) Explain step up and step down operators of angular momentum.

(b) For the octahedral point group, by using the character χ_α, prove that $\Gamma = T_{2g} + E_g$

(c) Find out the commutator value of [L–, L+].

3 Answer any two questions from the following. 14

(a) For m = m', prove that integral value is $\frac{3}{4}r^4 \sin^4\theta$.

(b) Prove that $<0\left|V_0\right|0> = -6$ Dq.

(c) Prove that $<2\left|\left(x^4+y^4+z^4\right)\right|2> = \frac{13}{21}r^4$

4 Answer any two questions from the following. 14

(a) Explain Vibronic coupling spectra of Ti (III).

(b) Explain the Jahn - Teller theorem.

(c) Discuss the Electronic spectra of first transition metal complexes.

5 Answer any seven questions from the following. 14

(1) According to Jacobian, what is the value of dr in polar coordinate?

(2) In d^1 case, what is the angle θ and φ ?

(3) What will be the value of l for d-orbitals?

(4) What are the values of ladder operators L_+ and L_- ?

(5) $<\pm 2 \mid V_{oct} \mid = 2> = ?$

(6) What are the values of the coefficients c_1 and c_2 for the Ψ_1 ?

(7) d^2 ion splits into which terms due to inter-electronic repulsion?

(8) What will be the value of the quantum number J ?

(9) What information can be provided by vibronic spectroscopy?

(10) What is the relation between distortion and overall energy of the species in a molecule?

4. CHN-603(P) : Physical Chemistry (Polymer Chemistry)

Instructions : (1) Attempt all questions.
(2) All questions carry equal marks.

1 (a) Write any two of the following : **2×5=10**

(i) What are differences between Elastomers, plastics and fibres, explain on the basis of glass transition temperatures.

(ii) Discuss different types of forces and chemical bonding observed in polymers.

(iii) Explain effect of average mol. wt. and mol. weight distribution on the properties of the polymers.

(iv) Discuss various types of polymers on the basis of microstructures based on geometrical structures.

(b) Do any one of the following : **1×4=4**

(i) What are polymers ? How are these different from lower molecular weight compounds ?

(ii) Prove that for polymers $M_w > M_n$.

2 (a) Answer any two of the following : **2×5=10**

(i) Write the mechanism of free radical chain polymerisation.

(ii) Explain polycondensation reactions and give general characteristics of polycondensation reactions.

(iii) Discuss kinetics of anionic chain polymerisation.

(iv) Define active centres. Explain coordination polymerisation mechanism considering Cosse's monometallic concept.

(b) Attempt any one of the following : **1×4=4**

(i) Discuss kinetics of coordination polymerisation on the basis of early kinetic model.

(ii) Derive an equation for degree of polymerisation for non-acid catalysed polycondensation reactions.

[Contd...

3 (a) Do any two of the following : 2×5=10

(i) Derive WLF equation.

(ii) Write down various methods used for determining the glass transition temperature.

(iii) Define glass transition temperature and explain various factors affecting glass transition temperature.

(iv) Explain glass transition temperature and glassy solids are explained on basis of state of phases.

(b) Attempt any one of the following : 1×4=4

(i) What are differences between primary and secondary glass temperature ?

(ii) Explain transition and associated property determination for true polymers are used to differentiate amorphous and crystalline polymers.

4 (a) Answer any two of the following : 2×5=10

(i) Degradation in Rubber.

(ii) Oxidative degradation in polymers.

(iii) Define crystallisability and discuss various factors affecting crystallisability.

(iv) Cylisation reaction in polymers.

(b) Do any one of the following : 1×4=4

(i) Explain Crosslinking type of reactions observed in polymers.

(ii) Define polymer degradation and its general types with examples.

5 Attempt any seven from the following : 2×7=14

(i) Polydispersity

(ii) Degree of polymerisation

(iii) Plastics

(iv) Optically active polymers

(v) Conditions necessary for coordination polymerisation.

(vi) Role or plasticisers.

(vii) Define Tf

(viii) Degradation in cotton clothes

(ix) Mechanical degradation

(x) Example of useful polymer-degradation.

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GDF-2635 Seat No._____

M. Sc. (Sem. III) Examination

January - 2016

CHN-604(D) - Environmental Chemistry

Time : 3 Hours] [Total Marks : 50

Instruction : Attempt all questions.

1 Write any four of the following : **4×5=20**

(i) Composition of atmosphere.
(ii) Biogeochemical cycle of Nitrogen.
(iii) Analytical methods for determination metals like mercury and arsenic.
(iv) Aquatic pollution due to industrial waste and sewage disposal.
(v) Pollution due to pesticides and herbicides.
(vi) Macronutrients in soil.
(vii) Hydrological cycle
(viii) Heat budget of atmosphere.

2 Write a note on any four of the following : **4×5=20**

(i) Continuous monitoring methods for air pollution.
(ii) Chemical and photochemical reactions leading to atmospheric pollution.
(iii) Green house effect.
(iv) Waste water management techniques used in India.
(v) Pollution due to radioactive pollutants.
(vi) Principles of biodegradation in reference to plastic recycling industry.
(vii) Sampling and analysis of Common Effluents.
(viii) Chernobyl tragedy.

3 Attempt five from the following : 2×5=10

(i) COD

(ii) Oil spills and water pollution

(iii) Vertical temperature

(iv) Micro nutrients

(v) Biodegradability

(vi) Smog

(vii) Ozone layer degradation

(viii) Name some water quality parameters

(ix) Purification of water

(x) Chloroflurohydrocarbons.

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MAV-3456 Seat No._____

M. Sc. (Sem. III) Examination

October / November - 2018

CPH - 601 : Statistical Mechanics & Nuclear Physics

(New Course)

Time : **3** Hours] [Total Marks : **70**

Instructions : (1) Symbols used have usual meaning.
(2) Figure to the right indicates marks of the question.

1 (a) Attempt any **two** : **10**

(1) What is ensemble ? State and prove Ergodic hypothesis.

(2) Explain Density of phase point discuss Liouville's theorem in classical mechanics.

(3) Explain density distribution of phase space.

(b) Attempt any **one** : **4**

(1) Explain condition for statistical equilibrium.

(2) Discuss Liouville's theorem in quantum statistical mechanics.

2 (a) Attempt any **two** : **10**

(1) Discuss photo electric effect and obtain formula for current density.

(2) Explain Bose – Einstein condensation.

(3) Obtain Einstein relation for mobility.

(b) Attempt any **one** : 4

(1) Obtain formula for compressibility of Fermi Gas.

(2) Discuss Einstein's derivation of Plank's law.

3 (a) Attempt any **two** : 10

(1) Discuss Breit Wigner Dispersion formula for l=0.

(2) Discuss ground state of the Deutron.

(3) Describe effective range theory in n-p scattering.

(b) Attempt any **one** : 4

(1) Discuss scattering length. Explain how it is obtained ?

(2) Discuss excited states of deutron.

4 (a) Attempt any **two** : 10

(1) Discuss CPT Theorem.

(2) Describe classification of elementary particles.

(3) Discuss Quark model.

(b) Attempt any **one** : 4

(1) Discuss Isospin.

(2) Explain Baryon number, Lepton number.

5 Attempt any **seven** : **14**

(1) What is White Dwarf ?

(2) Which metals are having compressibility close to compressibility of an electron gas.

(3) What is the Chandrasekhar limit ?

(4) What is black body radiation ?

(5) What is the magnitude of emmisivity for perfect black body ?

(6) Write formula for Stefan's constant.

(7) What is hypercharge ?

(8) What is the sign of scattering length when scattering state can be a positive ?

(9) For weak interaction Strangeness is conserved. True or false ?

(10) What is parity ?

MAV-3467 Seat No._____

M. Sc. (Sem. III) Examination

October / November - 2018

Physics : MS PHY CC - 302

(CPH - 602 : Digital Electronics & Programming in C - II)

Time : **3** Hours] [Total Marks : **70**

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

(2) Figures on R.N.S. indicate individual marks.

(3) The symbols have their usual meanings.

1 (a) Answer the following : (any **one**) **10**

(1) Explain SR flip flop using NAND gate and give its truth table. How can you change this into clocked SR flip flop, Explain it and give its truth table.

(2) What is shift register? Give types of shift registers and explain parallel in parallel out.

(b) Answer the following : (any **one**) **4**

(1) Explain truth table of JK flip flop.

(2) Write short note on SIPO.

2 (a) Answer the following : (any **one**) **10**

(1) Draw the circuit diagram of Johnson counter and explain it in detail.

(2) Explain any one type of D/A conversion with its circuit diagram.

(b) Answer the following : (any **one**) **4**

(1) Write short note on any one type of ADC.

(2) Explain 3-bit down counter truth table.

3 (a) Answer the following : (any **one**) **10**

(1) Define structure named as sem_3 with four structure elements paperl, paper2, paper3 and paper4. Write a program to scan the data for three students and print all together on the monitor screen.

(2) Write program to add five numbers 10, 15, 20, 25 and 00 using pointer variable. Write another program to multiply the same numbers using pointer. Write down your expected answer.

(b) Answer the following : (any **one**) **4**

(1) Write a program to copy one structure element into another.

(2) Write program to print 1 to 100 using pointer.

4 (a) Answer the following : (any **one**) **10**

(1) What do you mean by programming errors. Write note on common programming errors in development of C program.

(2) A file named SEM-3 contains a series of integer numbers. Code a program to read these numbers and then write all odd numbers to a file to be called ODD and all even numbers to a file to be called EVEN.

(b) Answer the following : (any **one**) **4**

(1) Explain fprintf() function with suitable example.

(2) Write short note on program design.

5 Answer the following : (any **seven** out of ten) **14**

(1) How many flip-flops are required to produce a divide-by-16 device?

(A) 1 (B) 4

(C) 6 (D) 7

(2) A Register is a group of _____.

(A) OR gates (B) OR & AND gate

(C) Flip-flops (D) None of these

(3) Draw circuit diagram of two bit binary adder.

(4) The _____ =4 bit in binary number system.

(5) What is full form of SIPO.

(6) Write down output of the following program

```
struct student
    {
int a, b, c ;
    } ;
    void main ( )
    {
        struct student a ;
        clrscr ( ) ;
        a . a=2 ;
        a . b=a . a ;
        a . c=a . a++ ;
        printf ("%d %d %d",a . a, a . b, a . c) ;
        getch ( ) ; }
```

(7) Write a program to scan five integer numbers and print it.

(8) Give truth table of AND gate.

(9) Explain getc() in C-language.

(10) Write down output of the following program

```
void main ( )
{
int *a, *b, *c, d ;
    *a=1 ;
    *b=2 ;
    *c=3 ;
    clrscr ( ) ;
    d=*a**b**c ;
    printf ("%d", d) ;
    getch ( ) ;
}
```

* M A V - 3 4 7 9 *

MAV-3479 Seat No._____

M. Sc. (Sem. III) Examination

October / November - 2018

Physics : CPH - 603

(Bio-Physics)

Time : 3 Hours] [Total Marks : 70

Instructions : (1) All questions carry equal marks.
(2) The symbols have their usual meanings.

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

(i) Classify the chromatographic techniques. Describe thin layer chromatography and paper chromatography and molecular exclusion chromatography.

(ii) Describe the procedure of diffusion and sedimentation in brief. Why we need to go for ultracentrifugation ? State application of ultracentrifugation.

(b) Write short note on any **one** of the following: **4**

(i) Describe Gel electrophoresis in detail.

(ii) Explain Low voltage electrophoresis.

2 (a) Answer any **one** of the following : **10**

(i) Describe Phase contrast microscopy, Fluorescence microscopy and Polarizing microscopy in detail.

(ii) Explain Fluorescence spectroscopy and Electron spin resonance in detail.

(b) Attempt any **one** of following : **4**

(i) Explain about the limits of resolution in detail.

(ii) Write short note on Raman Spectroscopy.

3 (a) Answer any **one** of the following : **10**

(i) Describe the Transmission Electron Microscope and Tunneling Electron Microscope with diagram.

(ii) what are measurable NMR parameters ? Describe each in detail.

(b) Attempt any **one** of following : **4**

(i) Explain preparation of the specimen for electron microscopy.

(ii) Describe the role of NMR in medicine.

4 (a) Answer any **one** of the following : **10**

(i) Describe the role of contractile protein in functioning of muscle. Write down the contraction mechanism of muscle.

(ii) What are optical defects of eye? Explain neural aspects of vision.

(b) Describe any **one** of the following : **4**

(i) Signal transduction.

(ii) Physics of Membrane potentials.

5 Answer the following : (any **seven**) **14**

(i) Why we cannot use glass lens in electron microscope ?

(ii) What is systolic and diastolic pressure ?

(iii) What is spin-spin coupling ?

(iv) What is Rayleigh scattering

(v) What is dark field microscopy ?

(vi) What is Nervous system ?

(vii) List the physical techniques to study the biological molecules

(viii) What is rotational diffusion coefficient ?

(ix) What is staining of the sample ?

(x) What is Atomic Force Microscope ?

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* M A V - 3 5 0 3 - 4 5 0 - 2 *

MAV-3503 Seat No._____

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

October / November - 2018

Research Methodology : EPH - 603

(Elective Course - Interdisciplinary)

Time : **2** Hours] [Total Marks : **50**

1 (a) Answer the following : (any **one**) **10**

(1) Explain the process of literature review and methods to do that.

(2) Write and Explain types of research in detail.

(b) Answer the following : (any **one**) **6**

(1) Discuss importance of references in research.

(2) What is review process and explain important steps of review process.

(c) Answer the following : (any **one**) **4**

(1) What is citation index and discuss any one method to calculate it.

(2) Write basic concepts of testing of hypothesis.

2 (a) Answer the following : (any **one**) **10**

(1) Discuss the precautions in presenting scientific data in research report.

(2) Discuss the difference between field work and laboratory work.

(b) Answer the following : (any **one**) **6**

(1) Discuss the methods used for making tables and figures in thesis writing.

(2) Discuss importance of summary and appendices in report.

(c) Answer the following : (any **one**) **4**

(1) Discuss importance of abbreviations in research report.

(2) Mention the different types of report, particularly pointing out the difference between a technical report and a popular report.

3 Answer the following : (any **five**) **10**

(1) What is research?

(2) List out computer aided tools for scientific documentation.

(3) What is full form of ISSN?

(4) What is impact factor?

(5) Define reference card.

(6) What is difference between research method and research methodology?

(7) What is difference between research paper and research article?

MAV-3488 Seat No. _____

M. Sc. (Chemistry) (Sem. III) Examination

October / November - 2018

CH - 503 : Environmental Chemistry

Time : **3** Hours] [Total Marks : **50**

Instruction : All questions are **compulsory** and carry **equal** marks.

1 (a) Explain the structure of earth's atmosphere. **10**

(b) Explain the generalized solar budget of the earth.

OR

1 Define environment. Discuss different components of environment in detail with their basic structure. **10**

2 What is hydrosphere ? Explain the important sources responsible for water pollution and enlist the water quality parameters and their standards. **10**

OR

2 (a) Explain DO and its significance. **10**

(b) Describe the effects of heavy metals on the soil quality.

3 (a) How would you monitor the ambient air ? Explain. **10**

(b) Explain the ozone cycle.

OR

3 (a) Write the sources of SOx and its effects on environment. **10**

(b) Explain the formation and deposition and acid rain.

4 Explain how thermal power plant emits pollutants in different layers of environment and their effects. **10**

OR

4 (a) Write a note on Biodegradation. **10**

(b) Explain the treatment of industrial effluents in brief.

5 Write short notes on any **two** : **10**

(1) Green Industry

(2) Waste management

(3) Effects of NOx on environment

(4) Pesticide as a pollutant.

MAV-3467 Seat No.

M. Sc. (Sem. III) Examination

October / November - 2018

Physics : MS PHY CC - 302

(CPH - 602 : Digital Electronics & Programming in C - II)

Time : **3** Hours] [Total Marks : **70**

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

(2) Figures on R.N.S. indicate individual marks.

(3) The symbols have their usual meanings.

1 (a) Answer the following : (any **one**) **10**

(1) Explain SR flip flop using NAND gate and give its truth table. How can you change this into clocked SR flip flop, Explain it and give its truth table.

(2) What is shift register? Give types of shift registers and explain parallel in parallel out.

(b) Answer the following : (any **one**) **4**

(1) Explain truth table of JK flip flop.

(2) Write short note on SIPO.

2 (a) Answer the following : (any **one**) **10**

(1) Draw the circuit diagram of Johnson counter and explain it in detail.

(2) Explain any one type of D/A conversion with its circuit diagram.

(b) Answer the following : (any **one**) **4**

(1) Write short note on any one type of ADC.

(2) Explain 3-bit down counter truth table.

3 (a) Answer the following : (any **one**) **10**

(1) Define structure named as sem_3 with four structure elements paperl, paper2, paper3 and paper4. Write a program to scan the data for three students and print all together on the monitor screen.

(2) Write program to add five numbers 10, 15, 20, 25 and 00 using pointer variable. Write another program to multiply the same numbers using pointer. Write down your expected answer.

(b) Answer the following : (any **one**) **4**

(1) Write a program to copy one structure element into another.

(2) Write program to print 1 to 100 using pointer.

4 (a) Answer the following : (any **one**) **10**

(1) What do you mean by programming errors. Write note on common programming errors in development of C program.

(2) A file named SEM–3 contains a series of integer numbers. Code a program to read these numbers and then write all odd numbers to a file to be called ODD and all even numbers to a file to be called EVEN.

(b) Answer the following : (any **one**) **4**

(1) Explain fprintf() function with suitable example.

(2) Write short note on program design.

5 Answer the following : (any **seven** out of ten) **14**

(1) How many flip-flops are required to produce a divide-by-16 device?

(A) 1 (B) 4

(C) 6 (D) 7

(2) A Register is a group of _____.

(A) OR gates (B) OR & AND gate

(C) Flip-flops (D) None of these

(3) Draw circuit diagram of two bit binary adder.

(4) The _____ =4 bit in binary number system.

(5) What is full form of SIPO.

(6) Write down output of the following program

```
struct student
    {
int a, b, c ;
    } ;
    void main ( )
    {
        struct student a ;
        clrscr ( ) ;
        a . a=2 ;
        a . b=a . a ;
        a . c=a . a++ ;
        printf ("%d %d %d",a . a, a . b, a . c) ;
        getch ( ) ; }
```

(7) Write a program to scan five integer numbers and print it.

(8) Give truth table of AND gate.

(9) Explain getc() in C-language.

(10) Write down output of the following program

```
void main ( )
{
int *a, *b, *c, d ;
    *a=1 ;
    *b=2 ;
    *c=3 ;
    clrscr ( ) ;
    d=*a**b**c ;
    printf ("%d", d) ;
    getch ( ) ;
}
```

MAV-3454 Seat No._____

M. Sc. (Sem. III) Examination

October / November - 2018

Botany : CBO-501

(Plant Physiology)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1) There are two sections in this question paper, both are compulsory and carry equal marks.

(2) Write answers of section-I and section-II in separate answer books.

(3) Figures at right indicate marks of questions and sub-questions.

(4) Give your answers with neat and labelled diagrams whenever required.

SECTION - I

1 Answer the following : (any **two**) **14**

1. Discuss: Influence of hormones and environmental factors on senescence.

2. Write: Causes and overcoming of seed dormancy.

3. Discuss: Physiological changes associated with seed germination.

2 Answer the following : (any **three**) 14

1. Describe: Hypersensitive response. (5)
2. Discuss: Stress and stressful environments. (5)
3. Explain: Mechanism of acquisition and transport of phosphorous in plants. (5)
4. Discuss: Salt stress. (4)
5. Discuss: Oxidative stress. (4).

3 Answer the following : (any **four**) 7

1. Explain: Role of potassium in plants. (2)
2. Explain: PCD. (2)
3. Name the hormone responsible for delaying abscission of leaves. (1)
4. The form of iron usually taken up by the plants from the soil. (1)
5. Define: Dormancy and explain secondary dormancy. (2)
6. Explain: Reactive oxygen species. (2)

SECTION – II

4 Answer the following : (any **two**) 14

1. Describe: Photophosphorylation and mechanism of electron transport.
2. Photochemical and biochemical properties of Cryptochromes.
3. Describe: C_4 cycle and its ecological significance.

5 Answer the following : (any **three**) **14**

1. Describe: Photoperiodism. (5)
2. Explain: Physiological effects of abscisic acid on plants. (5)
3. Discuss: Role of light in floral induction. (5)
4. Justify: inclusion of ethylene as a plant hormone. (4)
5. Discuss: Polyamines. (4)

6 Answer the following : (any **four**) **7**

1. Distinguish between: Oxidative phosphorylation and Photophosphorylation. (2)
2. Explain: Gluconeogenesis. Give the name of enzymes used in the process other than Glycolysis. (2)
3. Define: Vernalisation. (1)
4. Differentiate between: Cytokinin and Ethylene. (2)
5. Significance of PPP in plants. (2)
6. Write full name of 2,4-D. (1)

MAV-3494 Seat No. _____

M. Sc. (Part-II) (Sem. III) Examination

October / November – 2018

EBO-502 : Air Pollution and Climate Change

(Old & New)

Time : **2** Hours] [Total Marks : **50**

Instructions : (i) The question paper consists of two sections; each has two questions.

(ii) Write answer of each section in separate answer sheets.

(iii) Give your answer with neat and labeled diagrams whenever required.

SECTION - I

1 (a) Answer any two of the following questions : **10**

(1) Explain : Green house gas emission scenarios.

(2) Describe sulphur pollution effect on plant and human health.

(3) Describe : Nitrogen pollution effect on plant and human health.

(b) Answer any two of the following questions : **6**

(1) Write on mechanism of toxicity of sulphur derivatives.

(2) Write on metabolism of nitrogen derivatives.

(3) Explain Bioaccumulation of floride derivatives.

(4) Write on drivers of climate change.

(c) Answer any two of the following questions : 4

(1) Write on sources of Sulphur derivatives.

(2) Write on sources of Nitrogen derivatives.

(3) Write on sources of Fluoride derivatives.

(4) Write on gaseous pollutants.

2 Answer any five of the following questions : 5

(1) Which are the threshold fluoride derivatives ?

(2) Define : Climate change.

(3) Write on resistance of sulphur derivatives.

(4) Write on effect of nitrogen derivatives on ecosystem.

(5) Write on formation of nitrogen derivatives.

(6) Write on injury by the fluoride derivatives.

SECTION - II

3 (a) Answer any two of the following questions : 10

(1) Write on ozone depletion phenomenon.

(2) Write on effect of photochemical smog on plants.

(3) Write on effect of increased CO_2 on plants.

(b) Answer any two of the following questions : 6

(1) Describe effect of enhanced UV-B on plants.

(2) Describe : albedo.

(3) Describe : Acid rain formation.

(4) Describe : Sources of oxidants.

(c) Answer any two of the following questions : 4

(1) Write on causes of ozone depletion.

(2) Write on green house effects on natural vegetation.

(3) Write on causes of forest decline.

(4) Write on trends of acid rain.

4. Answer any five of the following questions. 5

a) Define Stratospheric ozone depletion.

b) Define Green house effect.

c) Define Global warming.

d) Define Acid rain.

e) What is biological action spectra ?

f) Define eco injury by acid rain.

MAV-3465 Seat No._____

M. Sc. (Part-II) (Sem. III) Examination

October / November – 2018

Botany : CBO-502

(Plant Resource Utilization Conservation and Biometry)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1) The question paper consists of two section, each has two questions.

(2) All questions are compulsory. In each section first two questions carry 14 marks and Last questions carry 7 marks.

(3) There is no overall choice. However, an internal choice has been provided in each question.

(4) Write answer of each section in separate answer sheet.

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

SECTION – I

1 Answer the following : (two out of three) of 07 marks each. **14**

1. Write short note on : adulteration in oil, Species, Cereals and pulses.
2. Explain : jute and cotton as plant fibers.
3. Write the origin, evolution, botanical characters, cultivation and uses of potato.

2 Answer the following : (three out of five) each of 05, 05 and 04 marks. 14

1 Describe in short Indigo as a day yielding plant.

2. Explain in short: plantation and uses of *Hevea* rubber.

3. Write note on : Accaia as a fire wood plants.

4. Explain: Aloe as a medicinal plant.

5. Describe: *Terminalia* as a timber yielding plant.

3 Answer the following : (four out of six) each 02,02,02 and 01 marks. 7

1. Give the scientific name, family and uses of coir.(2)

2. Write the origin of wheat.(2)

3. Give the scientific name of gaur bean. (1)

4. Write the scientific name and yellow compound presence in *Termerie*.(2)

5. Write any two name of medicinal plants in your syllabus. (2)

6. Give the nanie of main chemical compound of rubber.(1)

SECTION - II

4 Answer the following : (two out of three) each of 07 marks. 14

1. Explain : National park of India as a in-situ conservation.

2. What is *ex* situ conservation? Describe seed bank in short.

3. Write the general account of BSI.

5 Answer the following : (three out of five) each of 05,05 and 04 marks. 14

1. Describe Binomial distribution
2. Describe the various sampling techniques
3. Write a note on : Normal distribution
4. Write notes on : Types of correlation
5. Explain in short : Regression

6 Answer the following : (four out of six) each 02,02.02 and 01 marks. 7

1. Write note on : Biodiversity of Mangroves. (2)
2. State any four names of wild life sanctuaries of GuJarat.(2)
3. Write the full form of ICAR. (1)
4. Mention the formula of X 2-test. (2)
5. What do you mean by F-test and T-test. (2)
6. Write the uses of ANOVA.(1)

GDF-2627 Seat No.

M. Sc. (Part - II) (Sem. III) Examination

January - 2016

CBO-503 : Botany

(Molecular Biology & Biotechnology)

Time : 3 Hours] [Total Marks : 70

Instructions : (1) The question paper consists of two sections, each has two questions.

(2) All questions are compulsory. In each section first two questions carry 14 marks and last question carry 7 marks.

(3) There is no overall choice. However, an internal choice has been provided in each question.

(4) Write answers of each section in separate answer sheet.

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

SECTION - 1

1 Answer the following (two out of three) each of 7 marks. **14**

(i) Explain : Property of genetic code.

(ii) Describe : Replication of DNA.

(iii) Write in detail : Transcription in eukaryotes.

2 Answer the following : (three out of five) 14

(i) Explain the gene expression in prokaryotes.

(ii) Describe Proto-oncogenesis.

(iii) Explain the human genome project.

(iv) Explain in short : Wobble hypothesis.

(v) Write a short note on : Protein Synthesis.

3 Answer the following : (four out of six)

(i) Write in short : Termination Codon. 2

(ii) Describe the Z form of DNA.

(iii) What is cistron ? 1

(iv) Define : Lac operon. 2

(v) Explain in short : OKAZAKI FRAGMENT. 2

(vi) Define : Cell cycle. 1

SECTION - II

4 Answer the following (two out of three) each of 7 marks.

(i) Explain : Restriction enzymes.

(ii) Write short note : cDNA Libraries.

(iii) Explain the DNA finger printing.

5 Answer the following : (three out of five) 14
each of 05, 05 and 04 marks.

(i) Describe the hybridoma technology.

(ii) Discuss the role and importance of secondary metabolites in plants.

(iii) Explain in short : Herbicides resistance in transgenic plants.

(iv) Describe the process of germplasm storage.

(v) Explain : Cryopreservation.

6 Answer the following : (four out of six) 7

(i) Write the function of restriction enzyme.

(ii) Define Vactor.

(iii) Write the name the enzymes that joins the fragment of DNA.

(iv) Define : Somaconal variation.

(v) Explain the role of Agrobacterium in biotechnology.

(vi) Preserving germplasm in frozen state is _____.

MAV-3477 Seat No._____

M. Sc. (Part-II) (Sem. III) Examination

October / November – 2018

Botany : CBO-503

(Molecular Biology and Biotechnology)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1) The question paper consists of two section, each has two questions.

(2) All questions are compulsory. In each section first two questions carry 14 marks and Last questions carry 7 marks.

(3) There is no overall choice. However, an internal choice has been provided in each question.

(4) Write answer of each section in separate answer sheet.

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

SECTION – I

1 Answer the following questions (**two** out of **three**) **14**

each of 07 marks.

1. Describe the alternate forms of DNA.
2. Point out the properties of genetic code.
3. Explain: overlapping genes.

2 Answer the following questions (**three** out of **five**) **14**

each of 05,05 and 04 marks.

1. Describe the gene expression in prokaryotes.
2. Write a short note on: tumor inducing viruses.
3. Describe in brief: human genome project.
4. Explain: muton.
5. Explain: proto-oncogenes.

3 Answer the following questions (**four** out of **six**) **7**

each 02, 02, 02 and 01 marks.

1. What do you mean by termination codon? (2)
2. Explain in very short: new genetic code. (2)
3. Define: DNA replication. (1)
4. Explain the word: allellomorphism. (2)
5. Explain the term: cistron. (2)
6. Mention the full form of CDKs . (1)

SECTION - II

4 Answer the following questions (**two** out of **three**) **14**

each of 07 marks.

1. Describe: Polymerase Chain Reaction(PCR).
2. Mention the principles of gene cloning.
3. Write a short note on: DNA sequencing.

5 Answer the following questions (**three** out of **five**) **14**

each of 05, 05 and. 04 marks.

1. Write a short note on: embryo culture.
2. Describe: cryopreservation.
3. Explain: particle gun.
4. Write a short note on transgenic plants.
5. Discuss in brief: Production of secondary metabolites.

6 Answer the following questions (**four** out of **six**) **7**

each. 02, 02, 02 and 01 marks.

1. Define: Recombination of DNA.(2)
2. State two names of vectors used in biotechnology.(2)
3. State the one name of restriction enzymes.(1)
4. Explain the word: artificial seeds. (2)
5. Mention any two applications of somaclones. (2)
6. What do you mean by myeloma cells?(1)
