This question paper contains 3 printed pages]

AD—66—2015

FACULTY OF SCIENCE

B.Sc. (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

ZOOLOGY

Paper XIV

(Ethology, Biometry and Bioinformatics–I)

(Thursday, 29-10-2015) Time : 10.00 a.m. to 12.00 noon

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Illustrate your answer with suitable diagram wherever necessary.

1. Write short notes on any *four* : 8

(*i*) Imprinting

(*ii*) Taxis

P.T.O.

(*iii*) Mean

(*iv*) Primary data

(*v*) World Wide Web (WWW)

(*vi*) Histogram.

2. Write notes on any *two* : 8

(*i*) Instinct behaviour

(*ii*) Conditioning

(*iii*) Waggle dance of honey bee

(*iv*) Reasoning.

3. Write notes on any *two* : 8

(*i*) Auditory communication

(*ii*) Protective mimicry

(*iii*) Warning colouration

(*iv*) Tactile communication

4. Write notes on any *two* : 8

(*i*) Median

(*ii*) Geographical data

(*iii*) Methods of collection of data

(*iv*) Pie-diagram.

5. Describe in detail on any *one* of the following : 8

(*i*) Applications of bioinformatics

(*ii*) NCBI and Pub Med.

This question paper contains 8 printed pages]

AD—72—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2015

(Revised Course)

ZOOLOGY

Paper XV(A)

(Pisciculture)

Or

Paper XV(B)

(Applied Parasitology–II)

(Parasitic Nematodes and Arthropoda)

Or

Paper XV(C)

(Entomology–II)

Or

Paper XV(D)

(Environmental Biology–II)

(Thursday, 3-12-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

Paper XV(A)

(Pisciculture)

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Draw well labelled diagrams wherever necessary.

P.T.O.

1. Write notes on any *four* of the following : 8

   (*a*) Soil type;

   (*b*) *Cirrhina mrigala;*

   (*c*) Transportation of fish seed;

   (*d*) Basket Trap;

   (*e*) Dropsy;

   (*f*) Chilling.

2. Write notes on any *two* of the following : 8

   (*a*) Management of Aquatic Weeds and Aquatic insects in nursery ponds

   (*b*) Stocking density, supplementary feeding and harvesting of Rearing ponds

   (*c*) Manuring and Liming of stocking ponds

   (*d*) Water supply and Topography.

3. Write notes on any *two* of the following : 8

   (*a*) Biology of *Labeo rohita;*

   (*b*) Biology of Silver carp;

   (*c*) Striping method of induced breeding;

   (*d*) Wet bundh breeding.

4. Write notes on any *two* of the following : 8

(*a*) Cast net and gill net;

(*b*) Catamaron and vanchi;

(*c*) Costiasis;

(*d*) Gyrodactylosis.

5. Attempt any *one* of the following : 8

(*a*) Describe in detail freezing, drying, salting and canning.

(*b*) Give an account on various fish byproducts.

OR

Paper XV(B)

(Applied Parasitology–II)

(Parasitic Nematodes and Arthropoda)

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw suitable diagrams wherever necessary.

1. Write notes on any *four* of the following : 8

(*a*) Buccal capsule;

(*b*) Rhabditiform larva;

(*c*) Dracunculosis;

(*d*) *Sarcoptes scabiei*;

(*e*) Wasp;

(*f*) Insectivorous plants.

2. Write notes on any *two* of the following : 8

(*a*) Classification of parasitic nematodes;

(*b*) General organization of parasitic nematodes;

(*c*) Morphology of *Ancylostoma duodenale*;

(*d*) Life cycle of *Enterobius vermicularis*.

3. Write notes on any *two* of the following : 8

(*a*) Morphology and Pathogenecity of *Wuchereria bancrofti*

(*b*) Morphology of *Dracunculus medinensis*

(*c*) Life cycle of *Trichinella spiralis*

(*d*) Morphological adaptations in nematodes.

4. Write notes on any *two* of the following : 8

(*a*) Morphology of parasitic ticks

(*b*) Dengu fever and yellow fever

(*c*) Parasitic flies (any *two*)

(*d*) Life cycle of *Cimex lactularis* and its control measures.

5. Write long answer of any *one* of the following : 8

(*a*) Explain the chemical control of insects.

(*b*) Describe the morphology, life-cycle and pathogenecity of Anopleura.

OR

Paper XV(C)

(Entomology-II)

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw well labelled diagrams wherever necessary.

1. Write notes on any *four* of the following : 8

(*a*) Medical Pest;

(*b*) House Fly;

(*c*) Rat;

(*d*) Lac Insect;

(*e*) Repellent;

(*f*) Fumigant.

2. Attempt any *two* of the following : 8

(*a*) Explain the classification, life history and control measures of Lemon Butterfly.

(*b*) Explain the classification, life history and control measures of white grub.

(*c*) Explain the classification, life history and control measures of Pyrilla.

(*d*) Explain the classification, life history and control measures of Rice Weevil.

3. Attempt any *two* of the following : 8

(*a*) Explain the structure, life history and control of Head louse.

(*b*) Explain the structure, life history and control of Bed-bug.

(*c*) Write a note on Pig and their control.

(*d*) Write a note on monkey and their control.

4. Write notes on any *two* of the following : 8

(*a*) Silk and silkworm;

(*b*) Economic importance of Honey;

(*c*) Economic importance of Lac;

(*d*) Disease of silkworm.

5. Describe in detail any *one* of the following : 8

(*a*) Explain chemical control with stomach poison.

(*b*) Biological control of Insect pests.

OR

Paper XV(D)

(Environmental Biology-II)

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw labelled diagrams wherever necessary.

1. Answer any *four* from the following : 8

(*a*) Bio-degradable pollutants;

(*b*) Acid rain;

(*c*) Radioactive pollution;

(*d*) Infiltration;

(*e*) Pollution by heavy metals (Lead);

(*f*) Anaerobic treatment.

2. Answer any *two* questions from the following : 8

(*a*) Sources of water pollution;

(*b*) Eutrophication;

(*c*) Pollution by heavy metals;

(*d*) Effects of water pollution.

3. Answer any *two* questions from the following : 8

(*a*) Ozone as protector and destroyer;

(*b*) CFCs;

(*c*) Sources and effect of carbon dioxide pollution;

(*d*) Oxides of Nitrogen, its sources and effects.

4. Answer any *two* questions from the following : 8

(*a*) Sources of solid waste pollution

(*b*) Sources of Noise pollution

(*c*) Effect of Radioactive pollution

(*d*) Effect of Noise pollution.

5. Answer any *one* of the following : 8

(*a*) Environmental Education in India.

(*b*) Water treatment methods : sedimentation tank, aerobic treatment.

This question paper contains 3 printed pages]

AD—25—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

BOTANY

Paper XIV

(Genetics and Biotechnology)

(Wednesday, 21-10-2015) Time : 10.00 a.m. to 12.00 noon

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagrams wherever necessary.

1. Write notes on (any *four*) : 8

(*i*) Back cross

(*ii*) Monohybrid cross

P.T.O.

(*iii*) Sex-linked inheritance

(*iv*) Aneuploidy

(*v*) Totipotency

(*vi*) Cloning vectors

2. Write notes on (any *two*) : 8

(*i*) Law of dominance.

(*ii*) Dominant Epistasis.

(*iii*) Colourblindness in Man.

(*iv*) Sex determination in Man.

3. Write notes on (any *two*) : 8

(*i*) Collaboratory gene.

(*ii*) Complementary gene interaction.

(*iii*) Inheritance of hemophilia in Man.

(*iv*) zw-zz method of sex determination.

4. Write in detail any *one* of the following : 8

(*i*) What is polyploidy ? Explain Allopolyploidy with reference to Raphanobrassica.

(*ii*) What is tissue culture ? Describe applications of tissue culture.

5. Write notes on (any *four*) : 8

(*i*) Autopolyploidy;

(*ii*) Down's syndrome;

(*iii*) Callus culture;

(*iv*) Genomic library.

This question paper contains 7 printed pages]

AD—32—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

BOTANY

Paper XV

(Plant Pathology—II)

Or

(Systematic Botany—II)

Or

(Applied Economic Botany—II)

(Friday, 20-11-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

(Plant Pathology—II)

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagrams wherever necessary.

P.T.O.

1. Write notes on (any *four*) : 8

   (*i*) Scope of Aerobiology

   (*ii*) Thiram

   (*iii*) Control measure of loose smut of wheat

   (*iv*) Structure of teleutospore in *Puccinia graminis tritici*

   (*v*) Papaya mosaic

   (*vi*) Symptoms of Tikka disease of ground nut.

2. Write notes on (any *two*) : 8

   (*i*) Internal seed-borne pathogen

   (*ii*) Agar plate method

   (*iii*) Eradication

   (*iv*) Antibiotics.

3. Write notes on (any *two*) : 8

   (*i*) Disease forecasting

   (*ii*) Copper fungicide

   (*iii*) Chemical seed treatment

   (*iv*) Phytoalexins.

4. Describe in detail any *one* of the following : 8

(*i*) Symptoms, causal organism disease cycle and control measures of Rust of Jowar.

(*ii*) Symptoms, causal organism disease cycle and control measures of Wilt of Tur.

5. Write short notes on (any *two*) : 8

(*a*) Little leaf of Brinjal

(*b*) Symptoms of Ergot of Bajra

(*c*) Grassy shoot of sugarcane

(*d*) Disease cycle of downy mildew of Grapes.

OR

(Systematic Botany—II)

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagrams wherever necessary.

1. Write short notes on (any *four*) : 8

   (*i*) Stipules in Rubiaceae

   (*ii*) Labellum in archidaceae

   (*iii*) Bracts in Nyctaginaceae

   (*iv*) Stamens in Marantaceae

   (*v*) Morphology of pollen wall

   (*vi*) Who proposed pteridosperm theory ?

2. Write short notes on (any *two*) : 8

   (*i*) Floral morphology of Asclepiadaceae

   (*ii*) Economic importance of Apocyanaceae

   (*iii*) Floral morphology of Musaceae

   (*iv*) Economic importance of Zingiberaceae.

3. Write short notes on (any *two*) : 8

   (*i*) Floral morphology of Convolvulaceae

   (*ii*) Economic importance of Verbenaceae

   (*iii*) Floral morphology of Commelinaceae

   (*iv*) Economic importance of Cyperaceae.

4. Describe in detail any *one* of the following : 8

(*i*) Define palynology. Discuss in detail morphology of pollen grain of *Datura*.

(*ii*) Discuss origin of Angiosperms with the help of Gnetalean theory.

5. Write short notes on (any *two*) : 8

(*a*) Morphology of pollen grain of *Hibiscus*

(*b*) Importance of palynology

(*c*) Bennettitalean theory

(*d*) Concept of primitive flower.

OR

(Applied Economic Botany—II)

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Illustrate your answers with labelled diagrams wherever necessary.

1. Give in detail the origin cultivation practices, botanical descriptions and commercial uses of cotton. 8

Or

Write in short on :

(*i*) Uses of Turmeric

(*ii*) Cultivation practices of Dhaniya.

2. Give the history, cultivation practices, botanical description and economic importance of Tea. 8

Or

Write in short on :

(*i*) Cultivation practices and economic importance of Saffron

(*ii*) Economic importance of Khair.

3. Describe in detail origin, cultivation practices, botanical description and uses of Banana. 8

Or

Write in short on :

(*i*) Cultivation practices of Sugarcane

(*ii*) Industrial application of Maize.

4. What are petro-plants ? Describe cultivation practices botanical description and uses of Jatropha. 8

Or

Write in short on :

(*i*) Uses of varieties of Lantana

(*ii*) Botanical description and uses of Azadirachta sp.

5. Write short notes on any *four* of the following : 8

(*a*) Economic importance of Ambadi

(*b*) Economic importance of Coca plant

(*c*) Cultivation practices of Dalbergia

(*d*) Industrial application of Potato

(*e*) Nutritional value and uses of Bamboo

(*f*) Botanical description and uses of Acacia sp.

This question paper contains 4 printed pages]

AD—55—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

CHEMISTRY

Paper XIV (CH-303)

(Organic and Inorganic Chemistry)

(Monday, 23-11-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—2 Hours *Maximum Marks—40*

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Figures to the right indicate full marks.

Section A

(Organic Chemistry)

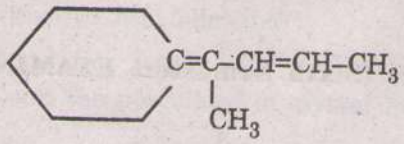
1. Answer any *five* of the following : 5×2=10

(*a*) Explain $n \rightarrow \sigma^*$ transition.

P.T.O.

(*b*) Calculate the $\lambda_{max.}$:

(*i*) $CH_3–CH=CH–CH=CH–CH=CH–CH_3$

(*ii*) 

(*c*) Explain Deshielding effect by taking example of Benzene.

(*d*) Predict the number of PMR signals of :

(*i*) Formaldehyde

(*ii*) Methanol

(*e*) How will you synthesize dipeptide by protecting –COOH group ?

(*f*) Give the general characteristics of proteins.

(*g*) What is the action of acetyl chloride on Glycine ?

2. Answer any *two* of the following : 2×5=10

(*a*) How will you distinguish 1–propanol, 2–propanol, and 2–methyl-2–propanol by using I.R. spectroscopy ?

(*b*) Explain Hofmann rearrangement with mechanism.

(c) Give the preparation of Glycine from potassium phthalimide. What is the action of the following on glycine ?

(i) Formaldehyde

(ii) NaOH.

3. Answer any *one* of the following : 1×7=7

(a) Explain Anionic polymerisation with mechanism. Give the synthesis and importance of :

(i) Thiokols

(ii) Neoprene.

(b) An organic compound with molecular formula $C_2H_4O_2$ gave the following spectral data :

U.V. : λ_{max} 204 (ϵ_{max} 50)

I.R. : Broad band between 3100-2700 cm^{-1} 1720 cm^{-1}

PMR :

(δ ppm) : δ 2.1 (S, 3H)

δ 11.8 (S, 1H, exchangeable with D_2O)

Deduce the structure of the compound.

P.T.O.

Section B

(Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9

(*a*) What are the postulates of crystal field theory of co-ordination compounds ?

(*b*) Calculate CFSE value of d^4, d^5 and d^6 system in tetrahedral complexes.

(*c*) Discuss the crystal field splitting of *d*-orbital in case of octahedral complexes.

(*d*) Give detailed account of the selection rule of electronic spectra.

(*e*) What are Orgel diagram ? Draw Orgel diagram for d^1 and d^9 system.

5. Solve any *two* of the following : 2×2=4

(*a*) Give *one* example of an outer and inner orbital complexes.

(*b*) How will you account for the blue colour of $CuSO_4 \cdot 5H_2O$?

(*c*) Find out the number of unpaired electrons in strong and weak field octahedral complexes of Fe^{+3}.

(*d*) What is meant by spectrochemcial series ?

This question paper contains 4 printed pages]

AD—61—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

CHEMISTRY

Paper XV (CH-304)

(Physical Chemistry and Inorganic Chemistry)

(Wednesday, 28-10-2015) Time : 10.00 a.m. to 12.00 noon

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Use of logarithmic table and calculator is allowed.

Section A

(Physical Chemistry)

1. Answer any *five* of the following : 10

(*i*) What are irreversible cells ? Give example.

P.T.O.

(*ii*) Calculate oxidation potential of half cell consisting of zinc electrode in 0.01 M $ZnSO_4$ solution at 25°C ($E^0_{Oxi} = 0.76\,V$).

(*iii*) Define work function and show that decrease in work function is equal to maximum work.

(*iv*) Define an expression for variation of Gibbs free energy with temperature.

(*v*) Explain the thermodynamic term partial molar property.

(*vi*) What are diamagnetic substances ? Give examples.

(*vii*) Define magnetic susceptibility and give its unit.

2. Answer any *two* of the following : 10

(*a*) Explain the concept of electrode potential on the basis of Nerns't solution pressure theory.

(*b*) Derive Gibbs–Duhem equation

(*c*) What are paramagnetic substances ? Explain the effect of temperature on it.

3. Answer any *one* of the following :

(*a*) What are concentration cells ? Derive expression for e.m.f. of concentration cell without transport. 7

(*b*) (*i*) Derive integrated form of Vant Hoff's equation from : 3

$$\frac{d(\ln K_p)}{dT} = \frac{\Delta H^\circ}{RT^2}$$

(*ii*) The equilibrium constant for the reaction $H_2(g) + S(s) \rightleftharpoons H_2S(g)$ is 18.50 at 925 K and 9.25 at 1000 K respectively. Calculate enthalpy of reaction ($R = 8.314\ JK^{-1}\ mol^{-1}$). 4

Section B

(Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9

(*a*) Give the different methods of preparation of diborane.

(*b*) What are carboranes ? How are they classified ?

P.T.O.

(c) Write the following properties of metalloboranes :

(i) Nitrous acid

(ii) Halogenation

(iii) Oxidation

(d) Discuss the biological roles of Ca^{+2}.

(e) Write a note on harmful effect of excess intake of metals on human body.

5. Solve any *two* of the following : 2×2=4

(a) What is the action of HCl and NaH on $C_2B_9H_{12}^-$?

(b) Give the IUPAC name of B_2H_6, B_4H_{10}, B_6H_{10} and B_6H_{12}.

(c) What is STYx number ? Write the STYx number of B_2H_6.

(d) Write the name of essential and trace elements.

This question paper contains 4 printed pages]

AD—33—2015

FACULTY OF SCIENCE/ARTS

B.Sc./B.A. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

(Revised Course)

MATHEMATICS

Paper XVII (MAT-305)

(Partial Differential Equations)

(Friday, 20-11-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :—(*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *five* of the following : 2 each

(*a*) Form the partial differential equation from :

$$z = (x + a)(y + b)$$

(*b*) Solve the partial differential equation :

$$yq - xp = z$$

where

$$p = \frac{\partial z}{\partial x},\ q = \frac{\partial z}{\partial y}$$

P.T.O.

(c) Solve :

$$p^2 + q^2 = 1$$

where

$$p = \frac{\partial z}{\partial x},\ q = \frac{\partial z}{\partial y}$$

(d) Solve the partial differential equation :

$$2\frac{\partial^2 z}{\partial x^2} + 5\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = 0.$$

(e) State the wave equation and one-dimensional heat flow equation.

(f) Write the Laplace equation in polar coordinates.

2. Attempt any *two* of the following : 5 each

(a) Explain the method for solving Lagrange's linear equation :

$$Pp + Qq = R$$

where P, Q, R are the functions of x, y, z and $p = \frac{\partial z}{\partial x},\ q = \frac{\partial z}{\partial y}$.

(b) Solve :

$$y^2 p - xyq = x(z - 2y)$$

(c) Solve the partial differential equation :

$$zx\frac{\partial z}{\partial x} - zy\frac{\partial z}{\partial y} = y^2 - x^2.$$

3. Attempt any *two* of the following : 5 each

(*a*) Explain the rules for finding the particular integral of the partial differential equation :

$$f(D, D')z = F(x, y)$$

when :

(*i*) $F(x, y) = e^{ax+by}$

(*ii*) $F(x, y) = \sin(ax + by)$.

(*b*) Explain the method for solving the equations of the type :

$$f_1(x, p) = f_2(y, q)$$

where

$$p = \frac{\partial z}{\partial x}, \; q = \frac{\partial z}{\partial y}.$$

(*c*) Solve :

$$\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = x + y.$$

P.T.O.

4. Attempt any *two* of the following : 5 each

(*a*) Using the method of separation of variables, solve

$$\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$$

where

$u(x, 0) = 6e^{-3x}$.

(*b*) Obtain the solution of the wave equation :

$$\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$$

by D'Alembert's Method.

(*c*) Find the solution of :

$$\frac{\partial^2 u}{\partial x^2} = h^2 \frac{\partial u}{\partial t}$$

for which $u(0, t) = u(l, t) = 0$, $u(x, 0) = \sin\left(\frac{\pi x}{l}\right)$ by method of variable separable.

This question paper contains 4+2 printed pages]

AD—47/48—2015

FACULTY OF ARTS/SCIENCE

B.A./B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

MATHEMATICS

Paper XVIII

(Topology)

OR

[Mechanics–II (Dynamics)]

(Saturday, 21-11-2015) Time : 10.00 a.m. to 12.00 noon

Time—Two Hours *Maximum Marks*—40

(Topology)

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to right indicate full marks.

1. Attempt any *five* of the following : 2 each

(*a*) Define finite complement topology.

(*b*) Define product topology.

P.T.O.

(c) Define limit print of a set.

(d) Define homomorphism

(e) Define separation of X.

(f) Define open map.

2. Attempt any *two* of the following : 5 each

(a) Prove that the set $Z_+ \times Z_+$ is countably infinite.

(b) Let β and β' be bases for the topologies λ and λ' respectively on X. Then show that following are equivalent :

(1) λ' is finer than λ

(2) For each $x \in X$ and each basis element $B \subset \beta$ containing x, there is a basis element $B' \in \beta'$ such that $x \in B' \subset B$.

(c) If $X = \{a, b, c\}$, let

$\lambda_1 = \{\phi, X, \{a\}, \{a, b\}\}$ and

$\lambda_2 = \{\phi, X, \{a\}, \{b, c\}\}$

Find the smallest topology containing λ_1 and λ_2 and the largest topology contained in λ_1 and λ_2.

3. Attempt any *two* of the following : 5 each

(*a*) If β is a basis for the topology on X and C is a basis for the topology on Y, then prove that the collection :

$$D = \{B \times C / B \in \beta \text{ and } C \in C\}$$

is a basis for the topology on $X \times Y$.

(*b*) Define subspace topology. If β is a basis for the topology on X, then show that the collection :

$$\beta_y = \{B \cap Y \mid B \in \beta\}$$

is a basis for the subspace topology on Y.

(*c*) Let X be a topological space. Then prove that the following conditions hold :

(*i*) ϕ and X are closed

(*ii*) Arbitrary intersection of closed sets are closed.

(*iii*) Finite union of closed sets are closed.

P.T.O.

4. Attempt any *two* of the following : 5 each

(*a*) Let Y be a subspace of X; let A be subset of Y; let $\overline{A}$ denote the closure of A in X. Then show that the closure of A in Y equals $\overline{A} \cap Y$.

(*b*) Show that the product of two Hausdorff space is Hausdorff.

(*c*) Let $X = A \cup B$, where A and B are closed in X. Let :

$$f : A \to Y \text{ and } g : B \to Y$$

be continuous. If $f(x) = g(x)$ for every $x \in A \cap B$, then show that f and g combine to give a continuous function $h : X \to Y$, defined by setting :

$h(x) = f(x)$ if $x \in A$ and $h(x) = g(x)$ if $x \in B$.

OR

[Mechanics–II (Dynamics)]

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *five* of the following : 2 each

(*a*) Define : Angular acceleration.

(*b*) Write the tangential and normal components of acceleration.

(*c*) Define : Linear momentum.

(*d*) Write the unit of work in C.G.S. and M.K.S. system.

(*e*) Define : Highest point of trajectory.

(*f*) Write the Cartesian equation of the path of a projectile.

2. Attempt any *two* of the following : 5 each

(*a*) Find the expression for velocity and acceleration in terms of vector derivatives

(*b*) Find the radial and transverse components of velocity

(*c*) A point moves in a curve so that its tangential and normal accelerations are equal and the tangent rotates with uniform angular velocity. Show that the intrinsic equation of path is of the form $S = A \cdot e^{\psi} + B$.

3. Attempt any *two* of the following : 5 each

(*a*) Prove that the principle of angular momentum.

(*b*) Prove that the kinetic energy of particle of mass m moving with velocity $\vec{V}$ is $\frac{1}{2} mV^2$.

(*c*) A bullet of mass m moving with velocity v strikes the block of mass M of thickness a. Find the resistance of the block, supposed to be uniform, if the bullet can penetrate through the distance $a/2$. If the block is free to move through what distance the bullet penetrates, the resistance remaining the same.

4. Attempt any *two* of the following : 5 each

(*a*) Find the fundamental equations of rectilinear motion.

(*b*) Find the condition of projectile to pass through a given point (h, k).

(*c*) When a particle is projected at an angle α with the horizontal, the horizontal range is R and greatest height is H, prove that :

$$\alpha = \tan^{-1}\left(\frac{4H}{R}\right)$$

This question paper contains 3 printed pages]

AD—65—2015

FACULTY OF SCIENCE

B.Sc. (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

PHYSICS

Paper (Phy-304) XIV

(Atomic, Molecular and Nuclear Physics)

(Thursday, 29-10-2015) Time : 10.00 a.m. to 12.00 noon

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *four* :

(*a*) Give any *four* quantum number associated with vector atom model. 2

(*b*) Show diagrammatically the L–S coupling and j–j coupling. 2

P.T.O.

(c) State the Lande's interval rule. 2

(d) What is meant by nuclear fusion ? 2

(e) Explain the radiative capture of a particle with an example. 2

(f) Explain the law of conservation of angular momentum. 2

2. (a) State and explain Stark effect. 4

(b) Explain in detail J–J coupling. 4

Or

(x) Explain the pure-rotational spectra of a diatomic molecule. 4

(y) What is the difference between the anomalous Zeeman effect and normal Zeeman effect ? 4

3. (a) Explain the following nuclear reaction : 4

(i) Inelastic scattering

(ii) Direct reactions

(b) Explain and estimate the energy release in fission of $_{92}U^{235}$ nuclei. 4

Or

(*x*) Explain in detail the energy production in stars. 4

(*y*) Explain in detail nuclear kinematics and Q-value of the nuclear reactions. 4

4. Explain in detail the Raman effect. 8

Or

Explain the neutron cycle in the thermal nuclear reactor.

5. Write notes on any *two* : 8

(*a*) Spatial quantization

(*b*) Regions of electromagnetic spectrum

(*c*) Nuclear fission as a source of energy

(*d*) Rotational–Vibrational spectra

This question paper contains 7 printed pages]

AD—70/71—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2015

PHYSICS

Paper XV (PHY-305/306)

(Digital and Communication Electronics)

OR

(Solar Energy)

(Elective paper)

(Thursday, 3-12-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

Paper XV (A) 305

(Digital and Communication Electronics)

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Non-programmable calculator/logarithm table is allowed.

P.T.O.

1. Solve any *four* of the following : 8

(*a*) Write Boolean expression for output of two input Ex-OR gate.

(*b*) Draw the truth table for three input OR–gate.

(*c*) Do the following conversions :

(1) $(54CD)_{16} = (?)_8$

(2) $(546)_8 = (?)_2$

(*d*) Give principle of amplitude demodulation.

(*e*) Convert the binary numbers $(1001)_2$ and $(1100)_2$ to equivalent Excess–3 numbers.

(*f*) Define frequency deviation ratio in frequency modulation.

(*g*) Write satellite frequency bands.

(*h*) Draw circuit diagram of Ex-OR gate using basic gates.

2. Solve any *two* of the following :

(*a*) State and explain commutative law for Boolean addition and multiplication for three variables A, B and C. Represent it with logic gates. 4

(*b*) Explain three variable K-map with a suitable example. 4

(*c*) Perform the following conversions : 4

(1) $(1001)_{ExS-3} = (?)_{10}$

(2) $(194)_{10} = (?)_{8}$

3. Attempt any *one* : 8

(*a*) Draw waveforms for AM. Explain and draw frequency spectrum of AM waves. Derive an expression for power output in AM.

(*b*) Draw neat labelled circuit diagrams for linear diode AM detector. Explain the operation of a diode as a demodulator for AM.

4. Attempt any *one* of the following : 8

(*a*) Draw well labelled block diagram of radio transmitter and explain working of each block.

(*b*) Explain in detail communication satellite.

5. Attempt the following :

(*a*) Explain in detail universal properties of a NANO-gate. 4

Or

Discuss in detail logical operation of Ex-OR gate.

(*b*) Explain in detail NOR gate as universal building block. 4

Or

Use K-map techniques to get SOP form of Boolean expression for the following K-map :

AB / CD	00	01	11	10
00	1	1		
01			1	1
11	1	1	1	1
10				

OR

Paper XV (B) 306

(Solar Energy)

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

1. Attempt any *four* : 8

(*a*) Write down any *two* standard values for solar constant provided by NASA.

(*b*) Explain the role of oxygen and ozone, water vapours and carbon dioxide, when solar radiation enters into earth's atmosphere.

(*c*) What are *two* different types of solar collectors ? How are they different from each other ?

(*d*) Describe in short role of glass in terns of greenhouse effect.

(*e*) Give the classification of biogas plants.

(*f*) Write down any *four* advantages of floating drum plant used for biogas.

(*g*) What are different types of fuel cells ?

(*h*) Enlist any *four* advantages of fuel cell.

2. Attempt any *two* : 8

(*a*) Explain in brief solar radiation at earth's surface.

(*b*) What are *two* main systems used in case of solar heating of a building ? Explain in brief.

(*c*) Give the classification of greenhouses. Explain in brief concept of greenhouse.

3. Attempt any *two* : 8

(*a*) Explain working of compound parabolic concentrator.

(*b*) Discuss in brief solar distillation.

(*c*) Write down advantages and disadvantages of floating drum plant of biogas.

4. Attempt any *one* : 8

(*a*) Discuss in detail design and working principle of a fuel cell.

(*b*) Explain physical principle of conversion of solar radiation into heat.

5. Write short notes on any *two* : 8

(*a*) Parabolic collector

(*b*) Solar cooker

(*c*) Advantages and disadvantages of fuel cell

(*d*) Photovoltaic systems.

This question paper contains 3 printed pages]

AD—12—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

MICROBIOLOGY

Paper XV

(Industrial Microbiology)

(Theory)

(Wednesday, 18-11-2015) Time : 10.00 a.m. to 12.00 noon

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Represent your answer with suitable figures and examples wherever necessary.

1. Answer the following (any *four*) : 8

(*i*) What is headspace ? Why is it essentially maintained in fermentor ?

(*ii*) Enlist antifoam agents.

P.T.O.

(*iii*) Define coagulation and flocculation in DSP.

(*iv*) Give uses of citric acid.

(*v*) Name *two* N_2 fixers which are used as commercial biofertilizer.

(*vi*) Define Lyophilization.

2. Write notes on (any *two*) : 8

(*i*) Batch fermentor

(*ii*) Cornsteep liquor

(*iii*) Methods of stock culture maintenance.

3. Write notes on (any *two*) : 8

(*i*) Primary screening for organic acid producer

(*ii*) Ion exchange adsorption

(*iii*) Production of thuricide.

4. Discuss in detail (any *one*) : 8

(*i*) Fermentative production of citric acid

(*ii*) Wine fermentation.

5. Write short notes on (any *two*) : 8

(*i*) Strain improvement program

(*ii*) Recovery of penicillin

(*iii*) Precursors in fermentation medium

(*iv*) Sulfite waste liquor.

This question paper contains 3 printed pages]

AH—14—2015

FACULTY OF COMPUTER STUDIES

B.Sc. (C.S.) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

(Revised Course)

COMPUTER SCIENCE

Paper S6.2

(Oracle 10G DBA)

(Monday, 23-11-2015) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. Attempt the following : 20

(*a*) Explain the functions of DBA.

(*b*) Explain online and offline table space.

(*c*) Explain system privileges.

(*d*) Explain creating ASM instance.

P.T.O.

2. (*a*) Explain working with table space. 8

(*b*) Explain ASM Architecture. 7

Or

(*c*) Explain Physical Backup. 8

(*d*) Explain Tuning SQL. 7

3. (*a*) Explain Undo Basics. 8

(*b*) Explain Resizing table space and data files. 7

Or

(*c*) Explain Fast incremental Backup. 8

(*d*) Explain tuning application design. 7

4. (*a*) Explain Database creation using DBCA. 8

(*b*) Explain Managing Undo table space. 7

Or

(*c*) Explain Data Pump Export/Import Process. 8

(*d*) Explain Tuning Application Design. 7

5. Write short notes on (any *three*) : 15

(*a*) Default temporary table space;

(*b*) ASM Instance Components;

(*c*) Managing Flash Recovery Area;

(*d*) Auditing Locations;

(*e*) Bulk Inserts.

This question paper contains 3 printed pages]

AH—08—2015

FACULTY OF COMPUTER STUDIES

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2015

(Revised Course)

COMPUTER SCIENCE

(Programming in Java—II)

(Friday, 23-10-2015) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Assume suitable data, if necessary.

(*iii*) Figures to the right indicate full marks.

1. Attempt the following : 20

(*a*) Explain types of JDBC drivers.

(*b*) Explain Java beans components.

(*c*) How to use color and font with 2D shape ?

(*d*) Explain servelets.

P.T.O.

2. (*a*) Explain how to create and delete cookies with examples. 8

(*b*) Explain scrollable and updatable result set in detail. 7

Or

(*c*) How do we set priorities for threats ? 8

(*d*) What is collection framework ? Write its implementation and algorithm. 7

3. (*a*) Explain the data handling using servelets. 8

(*b*) Write and explain multithreating concept in detail. 7

Or

(*c*) What is metadata ? Explain metadata in SQL with Java. 8

(*d*) What is JSP ? Explain mixing scriptlets and HTML. 7

4. (*a*) What is servelets ? Explain servelets Jobs. 8

(*b*) Explain collection classes in detail. 7

Or

(*c*) Write and explain how servelets shows per client access count. 8

(*d*) Explain how to create first JSP in detail. 7

5. Write short notes on any *three* of the following : 15

(*a*) Handling get and post request

(*b*) Running and starting thread

(*c*) Displaying images

(*d*) Hash set and tree set

(*e*) Session tracking.

This question paper contains 8 printed pages]

AH—26—2015

FACULTY OF COMPUTER STUDIES

B.Sc. (CS) (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2015

(Revised Course)

COMPUTER SCIENCE

Paper- S6.4 (Elective)

(Data Mining)

Or

(Research Methodology)

Or

(Bioinformatics)

Or

(Linux Administration)

(Friday, 4-12-2015) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

(Data Mining)

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Assume suitable data if necessary.

(*iii*) Figures to the right indicate full marks.

P.T.O.

1. Answer the following : 20

(a) Explain social implementations of data mining.

(b) Explain decision support system.

(c) Explain classification problem.

(d) Explain Information retrieval.

2. (a) Explain parallel and distributed algorithm. 8

(b) Write an algorithm to create a database tree. 7

Or

(c) What is decision tree ? Explain. 8

(d) Explain Hypothesis testing. 7

3. (a) What is DBSCAN ? Explain. 8

(b) Explain scalable DT Techniques. 7

Or

(c) Explain online analytic processing system. 8

(d) Explain data mining matrices. 7

4. (a) Explain Activation function in neural network. 8

(b) Explain PAM algorithm. 7

Or

(*c*) Difference between data mining and knowledge discovery in databases. 8

(*d*) Explain clustering with genetic algorithm. 7

5. Write short notes on (any *three*) : 15

(*i*) Sequence Discovery

(*ii*) Parametric and non-parametric techniques

(*iii*) C4.5

(*iv*) Agglomerative algorithm

(*v*) BIRCH.

Or

(Research Methodology)

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Assume suitable data if necessary.

1. Answer the following : 20

(*a*) Explain Brainstorming and clustering in your words.

(*b*) What is Data Analysis ? Explain.

(*c*) What is internet ? Explain in detail WWW.

(*d*) Define survey ? Discuss the advantages of surveys.

2. (a) Discuss the reasons for doing research. 8

(b) Explain in brief the data generation methods. 7

Or

(c) What is meant by sample size and response rate. 8

(d) What is meant by an experimental research strategy ? 7

3. (a) Explain the concepts of Internal validity in experimental research. 8

(b) What is case study ? Explain the types of case study. 7

Or

(c) Discuss the examples of case studies in IS and computing research. 8

(d) Discuss the issues related with internet based case studies. 7

4. (a) Explain the concept of generalization in case study. 8

(b) What are the issues to be address in planning and designing survey research ? 7

Or

(c) Explain in detail various literature resources. 8

(d) Explain how internet can be used during a literature review. 7

5. Write short notes on (any *three*) : 15

(*a*) Writing critical review

(*b*) Plagiarism

(*c*) Grounded theory and surveys

(*d*) Observation and measurement

(*e*) Information systems.

Or

(Bioinformatics)

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Assume suitable data if necessary.

1. Answer the following : 20

(*a*) What is Bioinformatics ? What Bioinformatics can do ?

(*b*) What is Gene ? Explain genetic view of gene.

(*c*) Explain Dot Matrix Method for sequence alignment.

(*d*) Explain in brief historical perspective of Drug Discovery.

2. (*a*) Explain in detail protein databases. 8

(*b*) Explain in detail the Tools for web search. 7

Or

(*c*) Explain structural databases in detail. 8

(*d*) Discuss the classification of various deta mining tools. 7

P.T.O.

3. (*a*) Explain structure of prokaryotic gene. 8

(*b*) Explain FASTA Algorithm in brief. 7

Or

(*c*) Explain Biological motivation of alignment problems. 8

(*d*) Explain Recommended steps for FASTA search. 7

4. (*a*) Explain pharmacogenetics and pharmacogenomics application. 8

(*b*) Explain in detail Genome Maps. 7

Or

(*c*) Compare FASTA and BLAST algorithms. 8

(*d*) Explain in brief Areas Influencing drug discovery. 7

5. Write short notes on (any *three*) : 15

(*a*) Bioinformatics Applications

(*b*) Nucleotide and Genome sequences

(*c*) Gene family

(*d*) End Free-space Alignment

(*e*) Gene.

Or

(Linux Administration)

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. Attempt the following : 20

(*a*) Explain Hardware Requirements.

(*b*) Explain Starting X.

(*c*) Explain text-editors.

(*d*) Explain CUPS.

2. (*a*) Explain Red-Hat Linux installation. 8

(*b*) Explain Linux Boot process. 7

Or

(*c*) Explain Basic X-window system. 8

(*d*) Explain Local printer installation. 7

3. (*a*) Explain configuring X-Window system. 8

(*b*) Explain changing user information. 7

Or

(*c*) Explain RPM for software management. 8

(*d*) Explain console print control. 7

4. (*a*) Explain system monitoring tools. 8

(*b*) Explain starting and stopping services. 7

Or

(*c*) Explain Graphical package management. 8

(*d*) Explain file promotions with example. 7

5. Write short notes on (any *three*) : 15

(*i*) Virtual consoles

(*ii*) Linux printing commands

(*iii*) Linux loader

(*iv*) Shells

(*v*) Managing print services.

This question paper contains 3 printed pages]

AH—20—2015

FACULTY OF COMPUTER SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2015

COMPUTER SCIENCE

(Business Application)

(Wednesday, 2-12-2015) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. Answer the following : 20

(*a*) Explain ATM applications.

(*b*) Explain features of Saving Bank Account.

(*c*) Explain customer enquiry.

(*d*) Explain services provided by E-banking.

P.T.O.

2. (a) Explain employee information system. 8

(b) Explain execution of an order. 7

Or

(c) What are the factors that govern recruitment. 8

(d) Explain geographic segmentation of market. 7

3. (a) Explain methods and technique of employee training. 8

(b) Differentiate between internal and external recruitment. 7

Or

(c) What are the functions of manpower planning. 8

(d) Explain functional architecture of ERP. 7

4. (a) Explain activities in supply chain management. 8

(b) Explain applicant information system. 7

Or

(c) Explain procedure to open a saving account. 8

(d) Explain inputs in training and development in employee training. 7

5. Write short notes on (any *three*) : 15

(*a*) BPO

(*b*) Risks in E-Banking

(*c*) Leave accounting

(*d*) Payroll

(*e*) Order preparation.

This question paper contains 2 printed pages]

AD—209—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2015

COMPUTER SCIENCE

Paper XIV

(Programming in Visual Basic)

(Friday, 11-12-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks—40*

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

1. Solve any *four* : 8

(*i*) Define event-driven programming.

(*ii*) Define variable.

(*iii*) What is DBMS ?

(*iv*) Define HTML.

(*v*) Define Web.

(*vi*) What is Protocol ?

P.T.O.

2. Solve any *two* : 8

(*i*) Explain elements of user interface.

(*ii*) Explain loop statements.

(*iii*) Explain concept of visual data manager.

3. Solve any *two* : 8

(*i*) Explain form types and appearance of forms.

(*ii*) Explain MDI application.

(*iii*) Explain internet and web control.

4. Solve any *one* : 8

(*i*) Explain concept of IDE.

(*ii*) Explain control structures in VB.

5. Write short notes on any *two* : 8

(*i*) Array

(*ii*) Child and form

(*iii*) Relational database

(*iv*) HTML printer.

This question paper contains 4 printed pages]

AD—213/214—2015

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2015

(Revised Course)

COMPUTER SCIENCE

Paper XV

(Computer Network)

Or

(Unix Shell Programming)

(Sunday, 27-12-2015) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

(Computer Science)

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Assume suitable data, if necessary.

1. Attempt any *four* of the following : 8

(*a*) Define computer Network. Explain any *two* uses of Computer Network.

(*b*) Explain in brief coaxial cable.

P.T.O.

(c) Explain the concept of switching.

(d) What is protocol ? Explain the purpose of FTP.

(e) Distinguish between wired and wireless network.

(f) What is web server ?

2. Solve any *two* : 8

(a) Explain the structure of telephone system.

(b) Explain types of network.

(c) Explain any *one* routing algorithm.

3. Solve any *two* : 8

(a) Explain network topologies.

(b) Explain the domain name system.

(c) Explain the cellular radio networks.

4. Solve any *one* : 8

(a) Explain in detail I/P addresses. Explain the concept of subnets.

(b) Explain in detail OSI reference model.

5. Write short notes on (any *two*) : 8

(a) ISP

(b) Internet Routing

(c) Email

(d) Bluetooth.

OR

(Unix Shell Programming)

N.B. :—(*i*) Attmept *all* questions.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *four* of the following : 8

(*a*) Define shell.

(*b*) What are metacharacters ?

(*c*) Explain advantages using Unix.

(*d*) What is interrupt ?

(*e*) Explain ls command.

(*f*) What is variable ?

2. Attempt any *two* of the following : 8

(*a*) Explain concept of exit codes.

(*b*) What do you mean by filter ?

(*c*) Write shell program for subtraction of two numbers.

3. Attempt any *two* of the following : 8

(*a*) Explain concept of shell variable.

(*b*) Explain any *two* built in functions.

(*c*) Explain procedure for writing and executing shell program.

P.T.O.

4. Attempt any *one* of the following : 8

(*a*) Explain concept of signal.

(*b*) Explain concept of Get and Put.

5. Write short notes on the following (any *two*) : 8

(*a*) Grep

(*b*) Command line parameters

(*c*) I/O environment

(*d*) Conditional Expressions