F.Y. B.A/B.Sc/B.Com. Sem-I. Date: 18/11/
FC101

Rizvi College of Arts ,Science & Commerce

FOUNDATION COURSE

PAPER-I

(2 ½ Hours) **[Total Marks : 75]**

N.B : (1) All questions are **compulsory.**

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

1) (a) Choose the correct alternative (any **eight**) : **8**

i) Telugu belongs to _____ language family.
(Dravidian, Indo-Aryan, Indo-European)

ii) _____ is the second largest religion in the world.
(Islam Hinduism, Christianity)

iii) Dowry harassment is a type of_____ violence against women.
(Social,Sexual,Domestic)

iv) _____ is the main cause of blindness.
(Cataract, Diseases, Deficiency in Vit A)

v) _____ refers to the attachment towards one's own region.
(Communalism, Regionalism, Linguism)

vi) _____ system is a social structure according to class of people, which gets decided by birth.
(Religion, Caste, political)

vii) Indian constitution provides _____ citizenship.
(Single, Dual, Triple)

viii)_____ refers to an environment that is characterized by healthy interpersonal and international relationship.
(Justice, Equality, Peace)

ix) The main aim of every political party is to promote _____.
(Secularism, Socialism, National interest)

x) Reservation of seats for women in the self-government is up to _____ seats.
(One Third, Two Third, Three Fourth)

(b) State whether the following statements are **True** or **False** (any **seven**) : **7**

i) Negritos were the earliest people to come to India.

ii) Female foeticide means killing of unborn baby girl.

iii) Mentally retarded persons do not suffer from physical problem.

iv) Hindi is the national language of India.

[TURN OVER]

v) Article 17 of Indian constitution abolishes untouchability.

vi) Constitution of India is flexible.

vii) Rajasthan is the first state to establish Panchayati Raj.

viii) India has not faced communal problem.

ix) Regionalism makes people narrow minded to think only about their region.

x) Women in India do not face sexual harassment at workplace.

2. Bring out clearly the multi-lingual and multi-religious characterstics of Indian society . **15**

OR

What are the different racial groups came to India .write a note on tribals of India.

3. Explain the factors responsible for declining gender ratio in India .What measures would you recommend to solve women problems in India? **15**

OR

What are the causes of physical impairment? What kind of treatments are available for it?

4. Define communalism. How does it affect society? How it can be handled? **15**

OR

What is regionalism? Explain the causes and measures to resolve it .

5. Why do we need constitution? What are the characteristics of Indian constitution?

OR

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

(a) Rural-Urban Dimension
(b) Socially challenged persons
(c) Caste system in India
(d) Role of Municipalities
(e) Fundamental duties of Indian citizenship
(f) Role of women in politics
(g) Grampanchayat
(h) Political party system in India

(FYS-108) Date:- 23/11/2019

SEM- I	F. Y. B. Sc PHYSICS – I	100 MARKS 3 HRS

Note: 1) All questions are compulsory.
2) Use of non- programmable calculator is allowed.
3) Draw figures wherever necessary.
4) Symbols have their usual meanings unless mentioned.

Q.1	(A)	Select the correct option	12
	i)	Working of venturimeter based on _____ (a) Archimedes's principle (b)Fermat's principle (c) Bernoulli's principle (d) none of these	
	ii)	For a homogeneous and isotropic material, Poisson's ratio is (a) $-1 < \sigma < 0.5$ (b) $-1 > \sigma > 0.5$ (c) $-1 > \sigma < 0.5$ (d) $\sigma > 1$	
	iii)	When focal length of marginal and paraxial rays is the same the .....aberration is zero. (a) spherical (b) chromatic (c) coma (d) both a) and b).	
	iv)	Constructive interference occurs when path difference is..... (a) $(2m+1)\lambda$ (b) $m\lambda$ (c) $(2m-1)\lambda/2$ (d) $m\lambda/2$	
	v)	The critical coefficient ($\frac{R\,T_c}{P_c T_c}$) has a value _____ . (a) $\frac{7}{3}$ (b) $\frac{3}{7}$ (c) $\frac{3}{8}$ (d) $\frac{8}{3}$	
	vi)	If thermodynamic process is isothermal, then first law of thermodynamic equation becomes _____ . (a) $dQ = du$ (b) $dQ = dw$ (c) $du = dw$ (d) $du = -dw$	
	(B)	Answer in one sentence :	03
	i)	Define Young's modulus.	
	ii)	State Stoke's law.	
	iii)	What is isolated system in thermodynamics?	
	(C)	Fill in the blanks	05
	i)	The dimension of viscosity are _____.	
	ii)	SI unit of stress is _____	
	iii)	For normal incidence ray, angle of refraction is	
	iv)	Correction in finite size of gas molecule in Vander Waal equation b = _____.	
	v)	At _____ pressure and _____ temperature, real gases behave like an Ideal gas.	
Q.2	(A)	Attempt any one	08
	i)	Using suitable illustration, explain the basic steps followed while solving problems based on the application of Newton laws of motion.	
	ii)	For a unit cube of homogeneous and isotropic material, show that $Y = 2\eta(1+\sigma)$	
	(B)	Attempt any one	08

	i)	State and prove Bernoullis equation.	
	ii)	Derive an expression for the couple required to produce a twist in a cylindrical rod fixed at one end.	
	(C)	Attempt any one	04
	i)	For a steel material $Y = 2 \times 10^{11}\ N/m^2$ and the bulk modulus is $K = 13.3 \times 10^{10}\ N/m^2$, calculate Poisson's ratio for silver.	
	ii)	Determine the horizontal force required to move a metal plate of area $2 \times 10^{-2} m^2$ with a velocity of $4.5 \times 10^{-2} m/s$, when it rest horizontal on a layer of oil $1.5 \times 10^{-3} m$ thick. The coefficient of viscosity of oil is $2 N\text{-}s/m^2$.	
Q.3	(A)	Attempt any one	08
	i)	Derive an expression for the equivqient focal length of a thick lens.	
	ii)	What is Chromatic aberration? Obtain an equation for it when object is at infinity.	
	(B)	Attempt any one	08
	i)	Explain with the help of a neat diagram , the theory of formation of interference in thin film.	
	ii)	Give the necessary theory for the formation of Newton's rings in reflected light. Show that the radius of the nth dark ring is proportional to the square root of a natural number.	
	(C)	Attempt any one	04
	i)	Find the radius of curvature for a lens of focal length of 30 cm and R.I 1.5 such that parallel incident light has minimum spherical aberration.	
	ii)	Calculate the wavelength of light that normally incident on a wedge shaped film of glass R.I of 1.47. The angle of wedge is 30°. The fringe width is 0.15 cm.	
Q.4	(A)	Attempt any one	08
	i)	Derive Boyle temperature from Van der Waal's equation.	
	ii)	Obtain an expression for the work done in isothermal process.	
	(B)	Attempt any one	08
	i)	Compare isotherms PV graph of Andrews experiment of CO_2 with Van der Waal's isotherms of PV graph.	
	ii)	Obtain the expression for adiabatic process in different form. $PV^{\gamma} = K$; $TV^{\gamma-1} = K'$; $T^{\gamma}P^{1-\gamma} = K''$.	
	(C)	Attempt any one	04
	i)	Calculate the Van der Waal's constant for dry air; given that $T_C = 132°K$, $P_C = 37 \cdot 2\ atmospheres$ and R per mole = $82 \cdot 07\ cm^3\ atom\ K^{-1}$.	
	ii)	A motor car tyre has a pressure of 2 atmospheres at the room temperature of 27°C. If the tyre suddenly bursts, find he resulting temperature and = $1 \cdot 4$.	

Q.5	Attempt any four		20
	i)	Derive the equation of continuity for a linear flow of a liquid in a pipe.	
	ii)	Derive an expression for the limiting value of Poisson's ratio σ considering relation between different elastic constant.	
	iii)	Explain Newton's ring experiment.	
	iv)	Write a brief note on a Gauss points.	
	v)	Calculate the critical constant of a gas. Given $b = 10^{-3}$, the unit volume being the gram molecules volumes at NTP and $a = 10^{-5}$, the unit of pressure being one standard atmosphere.	
	vi)	State and explain the first law of thermodynamics.	

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(FYS110) 25/11/2019

SEM-I	F. Y. B. Sc PHYSICS – II	100 MARKS 3 HRS

Note: 1) All questions are compulsory.
2) Use of non- programmable calculator is allowed.
3) Draw figures wherever necessary.
4) Symbols have their usual meanings unless mentioned.

Q.1	**(A)**	**Select the correct option**	**12**
	i)	$^{7}_{3}Li$ has _____ _____ (a) 3 protons, 7 nucleons (b) 3 nucleons , 7 protons (c) 3 protons, 3 neutrons (d)7 electrons, 3 nucleons	
	ii)	1 Rutherford = _____ disintegration/sec. (a) 10^4 (b) 10^5 (c) 10^6 (d) 10^7	
	iii)	The wavelength limit of X-rays when the X-ray tube is operated at 10 KV is _____ (a) 1.42 A^0 (b) 1.242 A^0 (c) 1.62 A^0 (d) 1.5 A^0	
	iv)	Which of the following is NOT a gas detector. (a) ionization chamber (b) cloud chamber (c) proportional counter (d) GM counter .	
	v)	The nucleus formed from fusion of two higher nuclei have a higher BE per _____. (a) atomic no. (b)amu (c) nucleon (d) none of these	
	vi)	For a perfectly black body coefficient of absorption is _____ (a) 1 (b) 0 (c) < 1 (d) 0 < a < 1	
	(B)	**Answer in one sentence:**	**03**
	i)	State the condition for ideal equilibrium.	
	ii)	State Wein's displacement law.	
	iii)	What is nuclear detector?	
	(C)	**Fill in the blanks**	**05**
	i)	Helium nucleus has ____ charge particle.	
	ii)	1 curie = _____ Bq.	
	iii)	Pulse ionization chamber is also called as _____	
	iv)	Wavelength of matter wave is = _____	
	v)	_____ is a direct conversion of radiant energy into matter.	
Q.2	**(A)**	**Attempt any one**	**08**
	i)	Define half life period of radioactive sample. Derive the necessary formula.	
	ii)	Explain Rutherford alpha particle scattering experiment with help of a neat labelled diagram	
	(B)	**Attempt any one**	**08**
	i)	Explain the following terms; Nuclear size, BE/ nucleon, Packing fraction , Nuclear density.	

	ii)	Explain the law of successive disintegration Derive an expression for the number of atoms in the first two daughter elements formed in the process.	
	(C)	**Attempt any one**	04
	i)	Find the (a)radius of nucleus (b) Volume and (c) mass of the copper nucleus. [Given: Atomic mass number of Cu = 63, r_0 = 1.4 fm]	
	ii)	A radioactive material reduces to 20% of its initial quantity in 10 hours. Calculate its decay constant	
Q.3	(A)	**Attempt any one**	08
	i)	Explain the construction and working of GM counter.	
	ii)	Explain nuclear fission reaction with examples.	
	(B)	**Attempt any one**	08
	i)	Explain the principle construction and working of gas filled detector.	
	ii)	What is Q value? obtain an expression for the endoergic reaction.	
	(C)	**Attempt any one**	04
	i)	Calculate the Q value for the decay of a neutron into a proton and an electron.	
	ii)	An alpha particle of energy 7.2 MeV produces 2.25 x 10^5 ion pairs in a gas. Calculate the energy required to create one pair.	
Q.4	(A)	**Attempt any one**	08
	i)	What is Compton Effect? Obtain an expression for Compton Shift.	
	ii)	Describe Davisson-Germer experiment to verify dual nature of light.	
	(B)	**Attempt any one**	08
	i)	Explain Bragg's spectrometer and how it is used for verification of Bragg's law.	
	ii)	State and explain Heisenberg's uncertainty principle.	
	(C)	**Attempt any one**	04
	i)	Calculate the De-Broglie wavelength of electron accelerated through P.D. of 2 V.	
	ii)	A X-ray tube operates at 20KV what is the shorter wavelength limit of continuous X-rays?	
Q.5	**Attempt any four**		20
	i)	Explain Carbon dating.	
	ii)	What is mass defect? Explain	
	iii)	Write a short note on Bremsstrahlung process.	
	iv)	Show that when photon falls in gravity it gains energy.	
	v)	Draw a neat diagram for proportional counter	
	vi)	Write a short note on nuclear fusion.	

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Dated 19/11/2019

F.Y.B.Sc- Sem-I Chemistry.
(FYS102)

[Time:3 Hours] [Marks:100]

Please check whether you have got the right question paper

N.B: 1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of log table/non-programmable calculator is allowed

Q1. (A) Select the correct option from the following sentences (attempt any twelve): 12

i. The branch of chemistry, which deals with the heat changes caused by chemical reactions, is called _____

(a) Thermodynamics (b) Thermal chemistry (c) Thermochemistry

ii. The units of heat are _____

(a) Deg and cal (b) Deg and Joule (c) Cal and Joule

iii. An example of a closed system is _____

(a) Hot water in an open beaker (b) Hot water in a closed insulated container (c) Hot water in a closed container

iv. The change in enthalpy that takes place when one mole of the compound is formed from its elements is called _____

(a) The heat of formation of compound (b) The heat of combustion (c) The standard Heat of formation

v. What will be the mass of 6.02 x 107 moles of CO _____

(a) 16g (b) 1.6 g (c) 28.01 g

vi. Number of moles corresponding to 90 g of water is _____

(a) 3 (b) 5 (c) 22

vii. _____ are nucleons.

(a) Protons and electrons (c) Neutrons and electrons
(b) Neutrons and protons

viii. An alpha particle is made of _____

(a) 4 positive charge and 2 mass unit (b) 4 mass unit and 2 positive charge (c) 2 positive charge and 2 mass unit 3.

ix. The atomic number of fluorine is 9 and mass number is 19. It consists _____

(a) 9 neutrons 19 protons (b) 10 protons 9 electrons (c) 9 protons 9 electrons

x. When electron changes its orbit from outer to inner level, energy is _____

(a) Released (c) neither absorbed nor released.
(b) Absorbed

xi. Across the period, there is decrease in atomic size; due to _____

(a) Shielding effect (c) increase in nuclear force of attraction
(b) photoelectric effect

xii. The elements belonging to same group in the periodic table have _____

(a) same atomic size

(b) same electronic configuration

(c) same number of electrons in outermost shell of their atoms

xiii. The shape of sp^3 hybridized carbon is _____

(a) Octahedral (b) Tetrahedral (c) Trigonal

xiv. The shape of sp^2 hybridized Nitrogen is _____

(a) Sp (b) sp^2 (c) sp^3

xv. The bond angle in sp^3 hybridized carbon is _____

(a) 120°15" (b) 110°10" (c) 109°28"

xvi. Bond angle in ethene molecule is _____

(a) 120° (b) 130° (c) 115°

xvii. The inductive effect of halogens _____ from fluorine to iodine.

(a) increases (b) constant (c) decreases

xviii. Trichloroacetic acid is highly acidic due to the -I effect of _____ groups.

(a) chloro (b) hyrdo (c) aldehyde

Q1. (B) State whether the following statements are true or false (attempt any three): **03**

i. For endothermic reactions AH is negative.

ii. One mole of hydrogen contains the same number of molecules as one mole of carbon dioxide.

iii. The suffix for aliphatic carboxylic acids is carboxylic acid.

iv. Halides are subordinate groups.

v. Water molecule has a linear geometry.

vi. Alkyl halides are less reactive than alkanes.

Q1. (C) Match the following (attempt any five): **05**

	A	B
i.	Enthalpy	a) R – CO – X
ii.	1μg/L	b) H*
iii.	Number of electrons in p – orbital	c) U + V
iv.	Bond length between Cl – Cl in Chlorine molecule	d) parts per million
v.	Acid halide	e) 6
vi.	Electrophic	f) 19.8 x 102mm
		g) R – X

Q2. Answer any four of the following: **20**

A) Define

(i) The First law of Thermodynamics (ii) Enthalpy (iii) Internal energy

B) Derive Kirchhoff's equation.

C) What are state functions? How do these differ from path functions?

D) Calculate the ΔH^o for the reaction $CO_{2(g)} + H_{2(g)} \longrightarrow CO_{(g)} + H_2O_{(g)}$

Given that ΔH_f^o of $CO_{2(g)}$, $CO_{(g)}$ and $H_2O_{(g)}$ are -393.5 $kJmol^{-1}$, -111.3 $kJmol^{-1}$ and -241.80$kJmol^{-1}$

E) Define Normality

How many grams of solute are required to prepare one litre of 0.2N solution of

(i) NaOH

(ii) $Pb(NO_3)_2$

[At. Wt. of Na=23, O=16, H=1, Pb=207, N=14]

F) Define Mole fraction

If the mass percent of methanol (mol. Wt.=32) in water is 4.7%. What is the mole fraction of methanol in the solution.

Q3. Answer any four of the following: **20**

A) Brief account of Rutherford alpha scattering experiment, atomic model and its limitations.

B) Write a note on Bohr's atomic model

C) Distinguish between electromagnetic wave and matter wave.

D) With the help of various series, explain the structure of hydrogen atom.

E) Obtain pairs among the following electronic configurations that would represent similar chemical properties of their atoms. Explain the logic behind the pairing.

(i) $1s^2\ 2s^2\ 2p^6\ 3s^1$ (iii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^5$ (iv) $1s^2\ 2s^1$

(ii) $1s^2\ 2s^2\ 2p^4$ (v) $1s^2\ 2s^2\ 2p^5$

F) State Slater's rules for the calculation of screening constant.

Q4. Answer any four of the following: **20**

A) Draw the structure of the given IUPAC names:-

(i) 2-chloro-3,4-dimethyl pentane (ii) But-2-en-1-al (iii) Ethyl Ethanoate (iv) 4-Amino-2-butanone (v) Pentanedioic acid

B) Write the IUPAC name of the following structure

(i) $CH_3-\underset{Cl}{CH}-\underset{Br}{CH}-CH_2-CH_3$

(ii) OHC-CHO

(iii) $HOOC-CH_2-CH(CH_3)_2$

(iv) $CH_3-\underset{CH_3}{CH}-CH_2-COOH$

(v) $CH_3-\underset{Br}{CH}-\underset{Cl}{CH}-CH_2-CH_3$

C) Explain the term hybridization. Identify hybridization of the hetero atom in the following molecule:

(i) CH_3-NH_2 (ii) CH_3-OH

(iii) $CH_3-NH-CH_3$ (iv) $CH_3-\overset{O}{\overset{\|}{C}}-CH_3$

D) Explain the difference between Sigma bond & pi bond.

E) Explain the formation, stability & structure of carbanion.

F) Explain the difference between Inductive effect & Electromeric effect with suitable examples.

Q5. Answer any four of the following: **20**

A) What is bond dissociation energy? Explain using suitable examples how is it calculated.

B) Define Molarity

What is the molar concentration (Molarity) of a solution containing 20g of CH_3OH in $200cm^3$ of solutions? [At. Wt. of C=12, O=16, H=1]

C) Define the term ionization enthalpy and its periodic trend for 2nd period and group 1 elements.

D) What are main group, transition and inner transition elements?

E) Explain sp^3 hybridization & sp^2 hybridization of carbon & nitrogen.

F) Explain the following with suitable examples:

(i) Electrophiles (iii) Elimination reaction (v) pH

(ii) Nucleophiles (iv) Substitution reaction

F.Y.B.Sc - Sem - I Chemistry - Date: 20/11/2019
(FYS103)

Rizvi College of Arts, Science & Commerce

October 2019

Paper 2

SEMESTER I

[Time: 3 Hours] **[Total Marks: 100]**

Please check whether you have got the right question paper.

N.B. : 1. All Questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of log-table/nonprogrammable calculator is allowed.

Q 1	(A)		Select the correct option (MCQ) (any twelve)	(12)
	i)		Due to Surface tension of the liquid it takes always (a) Spherical shape (b) Can take any shape (c) Rectangular shape	
	ii)		What is unit of Viscosity? (a) Coulomb (b) Newton second per square meter (c) Watt per meter per degree Celsius	
	iii)		The unit of rate constant for a Second order reaction is ------ a) $mol^{-1}\ dm^3 time^{-1}$ b) $time^{-1}$ c) $m\ time^{-1}$	
	iv)		As temperature increases, the rate of reaction --------- a) increases b) decreases c) stays the same	
	v)		Dextro (d)molecule rotates plane polarized light in a) anticlockwise direction b) Clockwise direction c) neither direction	
	vi)		Ozone is an allotrope of _____ a) Silicon b) Carbon c) Oxygen	
	vii)		The _____group from the following have the highest priority as per sequence rule a) -Cl b)-CH_3 c) –OH	
	viii)		Catenation property are exhibit by _____elements	

			a) Sodium b) Carbon c) Calcium	
	ix)		Lithium and Magnesium shows _____ relationship in the modern periodic table a) Diagonal b) Vertical c) Horizontal	
	x)		Which hybridization has minimum s characters a) sp^2 b) sp c) sp^3	
	xi)		Chemical name for quick lime is a) Sodium carbonate b) Calcium oxide c) Sodium Chloride	
	xii)		Refractive index can be determined by using	
			a) Abbe`s Refractometer b) pH meter c) Conductometer	
	xiii)		In Group 14 which element shows anomalous behavior a) Carbon b) Silicon c) Germanium	
	xiv)		Lithium on reaction with nitrogen forms nitrides which has formula a) LiN_3 b) Li_2N_3 c) Li_3N	
	xv)		Superoxides of sodium is a) NaO b) Na_2O c) NaO_2	
	xvi		Increase of carbon dioxide in the atmosphere causes a) Global warming b) Ozone depletion c) none of the above	
	xvii		Plane polarized light is produced by using a) Nicol prism b) Plane glass c) Magnifying lens	
	xviii		Staggered form has _____ energy than eclipsed form. a) more b) less c) same	

	(B)		State the following statements are true of false (any three)	(3)
		i)	Chemical kinetics ~~also~~ studies the mechanism of the reaction.	
		ii)	Molecularity and order of the reaction is same for the zero order reaction	
		iii)	Newmann projection formulation cannot be drawn for compound which has two asymmetric carbon atom	
		iv)	Sodium chloride is called common salt	
	(C)		Match the columns (any five)	(5)

1	Calcium carbonate	a	Only eclipsed conformation
2	Sodium Bicarbonate	b	Chemical Kinetics
3	Fischer projection formula	c	Chalk calcite
4	Sawhorse projection formula	d	Baking soda
5	Surface tension	e	Nm^{-2}
6	Studies the rate of chemical reaction	f	Both eclipsed and staggered conformation
		g	Nm^{-1}

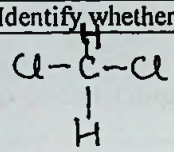
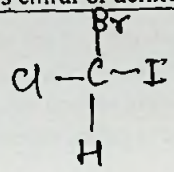
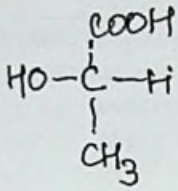
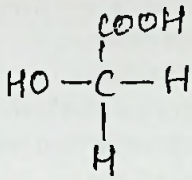
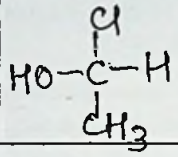
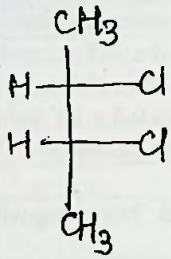
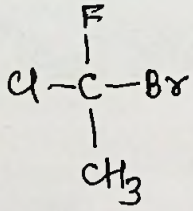
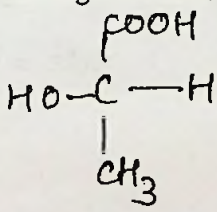
Q. 2			Attempt any four	
	A		Derive an expression for the rate constant for a First order reaction	(5)
	B		How will you calculate half life time for second order reaction	(5)
	C		Water and a liquid is taken in equal volumes to take 142 sec and 58 sec respectively to flow through the marks of viscometer. If density of the water is 0.997×10^3 kg/m^3 and that of the liquid is 0.8×10^3 kg/m^3. If the viscosity of water is 0.00101 NSm^{-2}. Calculate the viscosity of liquid.	(5)
	D		What are liquid crystals? Give its classifications	(5)
	E		For a certain first order reaction $t_{1/2}$ is 100 second. How long will it take for the reaction to be completed 75%?	(5)
	F		Find the Order and Molecularity for the given reactions	(5)

(a) $P_2O_5 \xrightarrow{\Delta} P_2O_2 + O_2$

rate $= K[P_2O_5]^1$

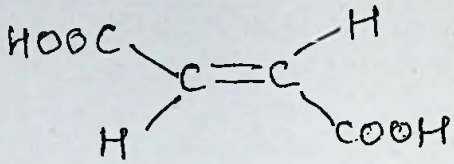
(b) $CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$

rate $= K[CH_3COOC_2H_5]^1[H_2O]^0$

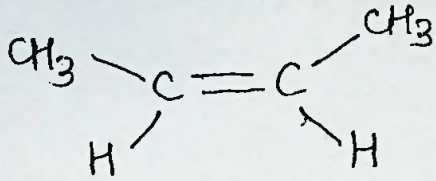
Q 3			Attempt any four	
	A		Identify whether the molecule is chiral or achiral in the following	(5)
		(a)		
		(b)		
		(c)		
		(d)		
		(e)		
	B			(5)
			Draw all possible structure for the above molecule in Fischer Projection formula and identify the pairs of enantiomers and diastereomers from it	
	C		Assign R and S configuration in the following molecules.	(5)
		(a)		
		(b)		

	D		Identify cis and trans, E and Z configuration as per the case, in the following molecules	(5)

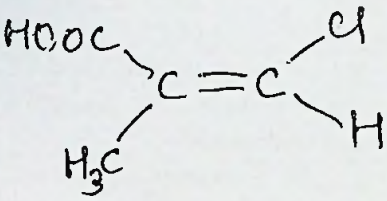
(a)



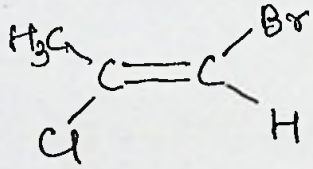
(b)



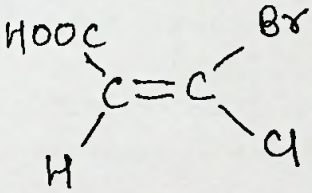
(c)



(d)

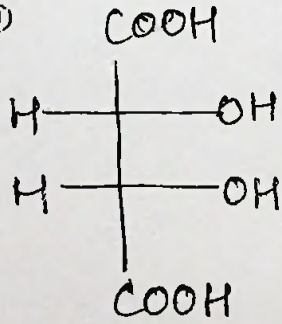


(e)

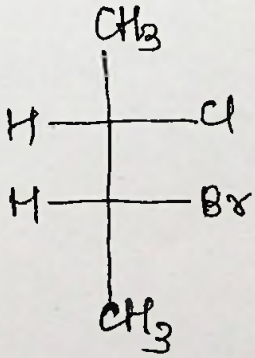


	E		Convert the following Fischer projection to Sawhorse projection for the following molecules	(5)

(a)



(b)



	F		What are Racemic mixtures? How will you resolve this mixture?	(5)

Q 4			Attempt any four	
	A		Name all the groups which constitute the main group elements. Write the electronic configuration of any two elements which are main group elements. Show which groups will show metallic properties and groups which shows non-metallic properties.	(5)
	B		Why Nitrogen shows anomalous behavior in Group 15	(5)
	C		Explain the following terms with suitable examples.	(5)
			a) Electronegativity b) Inert Pair Effect	(5)
	D		Explain the nitrides of Group 1 and Group 2	(5)
	E		Write notes on Acid rain.	(5)
	F		Write all the oxides of carbon. How these oxides are harmful to human beings and our environments?	(5)
Q 5			Attempt any four	
	A		Predict the nature of the graph, the value of slope and value of intercept, when a plot of log a/a-x vs time is plotted for a first order reaction.	(5)
	B		Write a short note on measurement of viscosity by Ostwald`s Viscometer	(5)
	C		Write note on carbides of alkali metal and alkaline earth metals.	(5)
	D		How will you prepare sodium hydroxide from brine solution? Explain any two properties and uses of sodium hydroxide.	(5)
	E		Explain D and L nomenclature with suitable example. How it differs from d(dextro) and l (leavo) form.	(5)
	F		Explain the term with suitable example.	(5)
			a) Optical isomers b) Flying wedge formula	
			XXXXXXXXXXXXXX	

F.Y.B.Sc. Sem-I Mathematics - 22/11/2019
(FYS-106)

NOTE:- 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of calculator is not allowed.

Q.1 Choose correct alternative in each of the following: **20**

(i) The sum of all binomial coefficients in the expansion of $(a+b)^n$ is

(a) 2^{n-1} (b) 2^n

(c) n^2 (d) $2n$

(ii) The Coefficient of a^2b^3 in the expansion of $(a+b)^5$is____

(a) 10 (b) 15

(c) 20 (d) None of these

(iii) If ma + nb = 1 then the GCD of two non zero integers a and b is

(a) 2 (b) 1

(c) 0 (d) None of these

(iv) $24 \equiv x \pmod 5$ then x = _____

(a) 3 (b) 5

(c) 4 (d) All of these

(v) If $f : X \to Y$ and $g : Y \to Z$ are surjective functions then the function $gof : X \to Z$ is_____ function.

(a) injective (b) surjective

(c) bijective (d) None of these

(vi) If R is a relation defined on Z such that aRb iff $2a + b$ is divisible by 3 is

(a) Transitive (b) Reflexive

(c) Symmetric (d) None of these

(vii) A binary Operation * defined on X is said to be Commutative if for any a , b, c ∈ X

(a) a*b = b*a (b) a*(b*c) = (a*b)*c

(c) Both (a) and (b) (d) None of these

(viii) Degree of a non zero constant polynomial is

(a) 0 (b) 1

(c) not defined (d) infinity

(ix) If a number 'a' is a root of the polynomial f(x) in R[x] then_____

(a) f(a) = 0 (b) x-a is the factor of f(x)

(c) both (a) and (b) (d) None of these

(x) If ω *and* ω' are Complex cube roots of unity then $\omega^2 =$ ___

(a) 0 (b) 1

(c) ω (d) ω'

Q.2 A) Attempt any ONE. **8**

(i) Prove that , there are infinitely many primes.

(ii) Prove that, if $a \equiv b \ (mod\ n) and\ c \equiv d\ (modn) then$

$a + c \equiv b + d\ (mod\ n) and\ ac \equiv bd\ (modn)$.

B) Attempt any TWO. **12**

(i) Find the g.c.d. of the integers 180 and 252 and express it as 180 m +252 n, where m, n ∈ Z.

(ii) Using principle of finite induction, prove that, if $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

then $A^n = \begin{bmatrix} 1 & n \\ 0 & 1 \end{bmatrix}, n \in N.$

(iii) Prove that, $\sqrt{13}$ is not rational.

(iv) Prove that, $787^{243} \equiv 5 \pmod 6$

Q.3 A) Attempt any ONE. **8**

(i) If f:X→Y is a function and A_1, A_2 are two non-empty subsets of X for non-empty sets A and B of X, prove that,

a) $f(A_1 \cup A_2) = f(A_1) \cup f(A_2)$

b)) $f(A_1 \cap A_2) \subseteq f(A_1) \cap f(A_2)$

(ii) If ~ is an equivalence relation on a non-empty set X, prove that,

a) Each element of X belongs to some equivalence class of X

b) Any two equivalence classes of X are either disjoint or identical

c) Union of these equivalence classes is X.

B) Attempt ant TWO. **12**

(i) Prove that the function f:R→ R^+ defined as f(x) = e^x is bijective.

(ii) Verify whether the operation $aob = a^2 + b^2$ where a & b ∈ Z is commutative or associatve.

(iii) Verify whether the relation R defined as aRb iff 2a + 3b is divisible by 5 for a, b ∈ Z is Symmetric, reflexive o transitive.

(iv) Find the equivalence classes in Z given by the relation R defined as, aRb iff 2a + b is divisible by 3.

Q.4 A) Attempt any ONE. **8**

(i) Prove that the only irreducible polynomials in R[x] are of degree 1 or 2.

(ii) If f(x) and g(x) are associates in R[x], prove that, f(x) = c.g(x) for suitable c ∈ R.

B) Attempt any TWO. **12**

(i) Find g.c.d. of the polynomials

$$x^4 - 5x^3 + 5x^2 - 15x + 6\,,\ x^3 + 2x^2 + 4x + 21.$$

(ii) If $r_1, r_2 and\ r_3$ are the roots of polynomial $x^3 - 2x^2 + 5 = 0$, find the polynomial whose roots are $3r_1, 3r_2 and\ 3r_3$.

(iii) Find all sixth roots of unity.

(iv) Find amplitude and Modulus of a complex number $1 - \sqrt{3}i$ and express it in polar form.

Q.5 Attempt any FOUR. **20**

(i) Prove that , $x^2 \equiv 0,1,4\ (mod\ 8)$

(ii) Find the least positive integer which leaves remainder 3 when divided by 2 , 4, 5 and 7.

(iii) Show that the function f: R-$\{\frac{-1}{2}\}$→ R-$\{\frac{3}{2}\}$ given by f(x) = $\frac{3x+5}{2x+1}$, is a bijective function.

(iv) Verify whether the binary operation "o" defined as

$aob = \frac{a+b}{5}$ where a & b ∈ Q , is commutative, associative.

Also find the identity element , if it exists.

(v) If $(f(x), g(x)) = 1$ and $f(x)/g(x).t(x)$, prove that, $f(x)/t(x)$

(vi) Prove that, the polynomial of degree n in $\mathbb{C}[x]$ has exactly n complex roots, counted with multiplicities.

F.Y.B.Sc. Sem-I FYS104 Date: 21/11/19

Paper / Subject Code: FYS102 **Mathematics Paper – I: CALCULUS – I (Revised)**

Time: 3 Hours Total Marks: 100

Note: 1. All questions are compulsory.

2. Figures to the right indicate full marks.

Q.1 Choose the correct answer in each of the following: (20)

i) The geometric mean of $2a, 6a, 18a$ where $a > 0$ is

(a) 6a (b) 12a (c) 216a (d) 36a

ii) If $A = (-2, 6]$ then

(a) inf A ∈ A (b) sup A ∈ A (c) inf A ∈ A, sup A ∈ A (d) None of the above

iii) Every nonempty subset of ℝ which is bounded above has

(a) infimum (b) supremum (c) neither supremum nor infimum (d) None of the above

iv) Let A: Every convergent sequence is bounded.

B: Every constant sequence in ℝ converges.

Then which of the following is true.

(a)A is true, B is false (b) A is false, B is true

(c) Both A and B are true (d) Both A and B are false

v) If $x_n = \frac{12n^3+n-3}{6n^3+4n+1}$ then $\lim_{n\to\infty} x_n$ is

(a) 3 (b) 1 (c) 2 (d) ∞

vi) A sequence (x_n) is monotone increasing, if

(a) $x_n \le x_{n+1}$ (b) $x_n \ge x_{n+1}$ (c) $x_n = x_{n+1}$ (d) $x_n > x_{n+1}$

vii) $\lim_{x\to\infty} \frac{3x}{2x^3+5x} =$

(a) 5 (b) 0 (c) 1 (d) 2

viii) If $f(x) = 2x^3 + 8$ *then* $\lim_{x\to -2} f(x) =$

(a) 2 (b) 8 (c) -8 (d) 10

ix) The function $f(x) = 5x + 9$ is continuous

(a) only if $x > 0$ (b) only if $x < 0$ (c) for each $x \in \mathbb{R}$ (d) None of these

x) The graph of a function $y = 2x + 3$intersects y- axis

(a) at (0, 0) (b) at every point (c) at (0, 3) (d) at (3, 0)

Q.2 (A) Attempt any ONE question from the following: (08)

i) State and prove the Cauchy – Schwarz inequality.

ii) Let S be a non-empty subset of $\mathbb{R}$ bonded above. Show that M = sup S if and only if

(i) M is an upper bound of S and

(ii) for any $\varepsilon > 0, \exists\, a \in S$ such that $M - \varepsilon < a \leq M$.

(B) Attempt any TWO questions from the following: (12)

i) Show that the multiplicative inverse of x in $\mathbb{R}$ is unique.

ii) State and prove Archimedean property of real numbers.

iii) Show that $|xy| = |x||y|$ for all $x, y \in \mathbb{R}$.

iv) If A and B are bounded subsets of $\mathbb{R}$, show that $A \cup B$ is also bounded.

Q.3 (A) Attempt any ONE question from the following: (08)

i) If (x_n) and (y_n) are two sequences such that $x_n \to p$ and $y_n \to q$ then show that

$x_n + y_n \to p + q$

ii) Show that a monotone increasing sequence which bounded above is convergent.

(B) Attempt any TWO questions from the following: (12)

i) Show that if a sequence converges then it converges to a unique limit.

ii) Define a Cauchy sequence. Show that a sequence $x_n = \frac{4}{n}$ $for\ all\ n \in \mathbb{N}$ is a Cauchy sequence.

iii) . Show that the sequence (x_n) where $x_n = \frac{1}{n+1} + \frac{1}{n+2} + \cdots + \frac{1}{n+n}$ $for\ all\ n \in \mathbb{N}$ is convergent.

iv) If (x_n) is a bounded sequence and $y_n \to 0$, show that $x_n y_n \to 0$.

Q.4 (A) Attempt any ONE question from the following: (08)

i) If $\lim_{x\to a} f(x) = l$ *and* $\lim_{x\to a} g(x) = m$ *then* prove that $\lim_{x\to a}(f(x)g(x)) = lm$

ii) Let $f: \mathbb{R} \to \mathbb{R}$ be a function and $p \in \mathbb{R}$. If $(f(x_n))$ converges to $f(p)$ for any sequence (x_n) converges to p then prove that f is continuous at p.

(B) Attempt any TWO questions from the following: (12)

i) Show that $lim f(x)$ *as* $x \to 1$ exists, if $f(x) = 8x + 3$ *by using* $\epsilon - \delta$ *definition.*

ii) State the Sandwich theorem for limits. Hence find $lim f(x)$ *as* $x \to \frac{\pi}{2}$ if

$$8sinx - 11cosecx \leq f(x) \leq 10cosx + 3sin^3x - 6cosecx.$$

iii) Examine the continuity of $f(x)$ at $x = 1$ *and* $x = 2$ where $f(x)$ is defined by

$$f(x) = \begin{cases} 2x + 4, & 0 \leq x \leq 1 \\ 3x + 1, & 1 \leq x \leq 2 \\ 8x - 9, & 2 \leq x \leq 3. \end{cases}$$

iv) Show that the function $f(x) = cosx$ is continuous for all $x \in \mathbb{R}$.

Q5. Attempt any FOUR questions from the following: (20)

a) State and prove the Arithmetic – Geometric mean inequality.

b) Find the disjoint neighborhoods of $\sqrt{5}$ *and* $\sqrt{7}$ by using Hausdorff property of $\mathbb{R}$.

c) Show that the sequence $x_n = (-1)^n$ does not converge.

d) If (x_n) and (y_n) are Cauchy sequences in $\mathbb{R}$, show that (z_n) is also Cauchy sequence in $\mathbb{R}$

where $z_n = 5x_n + 17y_n$.

e) If $f(x) = x^3 + 1$ *and* $g(x) = \frac{2x+4}{x-6}$ then find $f \circ g(x)$ *and* $g \circ f(x)$ *as* $x \to 1$.

f) Draw the graph of the function $f(x) = |x + 2|$ *for* $-3 \leq x \leq 3$

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(FYS105)

Date: 21/11/2019

FYBSC : BOTANY : PAPER 1 SEM 1 MARKS : 100

ALL QUESTONS ARE COMPULSORY

ALL QUESTIONS CARRY EQUAL MARKS

ILLUSTRATE YOUR ANSWERS WITH NEAT AND LABELLED DIAGRAMS

Q1. A) Choose the correct option from the following and rewrite the sentence 10

i) Riccia reproduces vegetatively by .....

a) fargementation b) tuber c) persisten apices d) all of the above

ii) the chloroplast in spirogyra is ---- shaped

a) disc b) cup c)spiral d) star

iii) Akinites are found in spirogyra by
a) asexual reproduction b)sexual reproduction c)vegetative d) all of the above

iv) Fungi growing on dung is known as
a) Coprophilous b)obligatory c) facultative d) predaceious

v) Cleistothecium is the fruiting body of
a) Aspergillus b) mucor c)riccia d) spirogyra

vi) Cell wall in fungus is made up of ----

a)Cellulase b) pectin c) hemicellulose d)Chitin

vii) Which of the following is a liver wort
a) Riccia b) anthoceros c) rhizopus d) mucor

viii) Rhizopus Belongs to order -------

a)Mucorales b) Erysiphales c)Pucinniales d) Aspergillales

ix) Alternation of generation in spirogyra is --------

a) Haplontic b)Diplontic c)Haplo-diplontic d) Diplohaplontic

x) in Riccia how many rows of cells form the neck of archegonia

a)2 b) 4 c) 6 d)8

B) Answer in one or two sentences **10**

1) Coenocytic mycelium
2)Asexual spores in Aspergillus
3)Chloroplast in spirogyra
4)coenobium
5) fragmentation in spirogyra

Q2.. Answer the following in brief (any two) **20**

a) discuss general characters of Chlorophyta
b)Describe reproduction in Nostoc
c) Describe reproduction in spirogyra
d) give economic importance of algae

Q3. Answer the following in brief (any two) **20**

a) Give economic importance of fungi
b) Describe modes of nutrition in fungi
c) Classify Rizopus. Discuss reproduction in rhizopus.
d) Classfy Aspergillus. Writ in detail about its fruiting body.

Q4. Answer the following in brief (any two) **20**

a) Describe theinternal structure of thallus of Riccia . Add a note on its systematic postion
b) Describe the sporophyte of Riccia in detail.
c) Write in detail general characters of Hepaticeae
d)Describe sexual reproduction in Riccia.

Q5. Write short notes(any Four) **20**

a) Spores and spore germination in Riccia.
b) Rhizoids in Riccia
c) Sex organs of Aspergillus
d) Haustorium
e) Structure of Nostoc cell
f) Heterocysts

F.Y.B.Sc Sem. I Botany. Date: 22/11/19
(FYS107)

Semester I **Botany II**

Time: 3 Hrs Marks :100

All questions are compulsory and carry equal marks.
Illustrate your answers with neat and labelled diagrams.
Figures to the right indicate full marks.

Q.1.A. Select an appropriate option and rewrite the sentence. **10**

1.The dark reaction of the photosynthesis takes place in:
o Grana of chloroplast o Stroma of chloroplast
o membrane of mitochondrion o Lysosomes
2.Secondary cell wall is made up of:
o cellulose & lignin o cellulose & pectin
o hemicellulose o cellulose & glycoproteins
3.The plant cell walls are interrupted by tiny holes through which delicate connections between the internal media of the adjacent cells may run. These connections are called:
o fibrous lamina o Axial connections
o equatorial connections oplasmodesmata
4.Cell wall is absent in:
o both plant and animal cells o animal cells
o plant cells o none of the above
5. The type of inheritance pattern where neither gene dominatescompletely over the other and partially expresses itself is called:
o Dominance inheritance o Intermediate inheritance
o Recessive inheritance oOdd inheritance
6. When a tall plant with rounded seeds (TTRR) is crossed with a dwarf plant with wrinkled seeds (ttrr), the F1 generation consists of tall plants with rounded seeds, how many gametes would be produced by an F1 plant?
o 1 o 3
o 4 o8
7. The genes present on an organism represent the organism's _____
o Genotype o phenotype
o Physical traits o Behavioral triats
8. How many alleles for one trait are normally found in a genotype of diploid organism?
o 1 o 2
o 3 o 4
9. In dominant epistasis, the Mendel's dihybrid ratio of 9:3:3:1 is changed to:
o 9: 3: 4 o 15 : 1
o 9: 7 o 13 : 3
10. In duplicate dominant epistasis, the Mendel's dihybrid ratio, 9:3:3:1 is changed to:
o 9: 3: 4 o 15 : 1
o 9: 7 o 9 : 6 : 1

Q.1.B.Answer the following questions in one to two lines. **10**

a. What is Cytology? Name the cell organelle responsible for Photosynthesis.
b. Define Ecosystem.
c. State the law of thermodynamics.
d. What is Intermediate inheritance?
e. Define Phenotype and Genotype.

Q.2. Answer any two of the following question. **20**

a. Describe ultrastructure and state the functions of Cell Membrane.
b. Give an account on ultrastructure of eukaryotic plantcell.
c. Explain the functions of Cell wall with suitable diagram.
d. Draw and describe the structure of Endoplasmic reticulum.

Q.3. Answer any two of the following questions. **20**

a. Explain Energy flow in an ecosystem. Give an account of ecological models.
b. Discuss different types of productivity in an ecosystem.
c. Give an account on fresh water ecosystem and discuss its components.
d. Explain Pyramids of Energy, Number and Biomass.

Q.4. Answer any two of the following questions. **20**

a. Explain multiple alleleswith reference to Blood groups in Man.
b. State and explain the law of Segregation.
c. Explain complete and incomplete dominance giving examples.
d. Explain dominant epistasis resulting in 9:3:4 ratio with suitable example.

Q .5. Write short notes on any four of the following questions. **20**

a. Chloroplast and it's functions
b. Functions of cell wall
c. Food chain and food web
d. Abiotic components
e. Monohybrid ratio
f. Test cross and Back cross

FYBSc. Zoology Semester I

Date: 23/11/19

Paper I

Time: 3 hrs (FYS109) Marks: 100

Note:
1. All questions are compulsory
2. All questions carry equal marks
3. Draw neat labelled diagram wherever necessary

Q1. A) Fill in the blanks (05)

a) _____ tila pia protects the egg in the buccal cavity

(Female, Male, both male and female)

b) Bioluminescence is seen in_____

(Sea horse, Angler fish, Butterfly)

c) Quinine drug obtained from _____ tree is useful in treatment of malaria.

(*Cinchona officinalis, Digitalis purpurea, Taxus brevifolia*)

d) _____ _____ is rightly honoured as the 'Father of white revolution'

(Dr. Varghese Kurian, Dr. M.S. Swaminathan, Manju Meena)

e) _____ is the largest biotech company in Asia.

(Kwality, Dhara, Biocon)

Q1.B) Match the column (05)

Column I		Column II	
a)	Earthworm	i.	Intra-specific diversity
b)	Echolocation	ii.	Anna
c)	Genetic diversity	iii.	Bats
d)	Taxonomic diversity	iv.	Regeneration
e)	Grain Bank	v.	Inter-specific diversity

Q1.C) State whether true or false (05)

a) Phrynosoma is a desert reptile

b) Fats stored in the hump of camel help them to survive in desert for longer periods without food and water.

c) Biodiversity is degree of variation of life.

d) Pit viper is used for making penicillin antibiotic.

e) Baba Amte received United Nations Prize in the field of Human Rights.

Q1.D) Answer in one sentence (05)

a) Define longitudinal migration

b) What is seed gene bank?

c) What is cryopreservation?

d) Who wrote the 'Book of Indian Birds'?

e) Name two value added products.

Q2. A) Explain the process of Pearl formation in mollusc. (10)

OR

A) Give an account of desert adaptation in camel. (10)

Q2. B) Write short notes on any two. (10)

a) Any two types of coral reefs.

b) Any five types of bird migration.

c) Parental care in Tilapia.

d) Brood parasitism in cuckoo.

Q3.A) What is a biodiversity hotspot? Explain Western Ghats as biodiversity hotspot in India. (10)

OR

A) Give an account of ex – situ conservation strategies.

Q3.B) Write short notes on any two. (10)

a) Importance of biodiversity.

b) Genetic biodiversity.

c) Direct use value of biodiversity.

d) Convention on biological diversity.

Q4. Answer any two of the following. (20)

a) Describe in detail work and achievements of Dr. Khorana.

b) Explain in detail water conservation achieved at Raleganslddhi.

c) Give an account on the life sketch of Baba Amte.

d) Describe the contribution of Deepak Gadre in development of Gadre fishery.

Q5) Write short notes on any four. (20)

a) Echo location in bats.

b) Importance of bioluminiscence.

c) Deforestation.

d) IUCN

e) Anand Milk Union Ltd.

f) Contributions of 'Birdman of India'.

FYBSc. Semester I

Zoology Paper II

Date: 25/11/2019

Time: 3 hrs (FYS-111) Marks: 100

N.B: 1. All questions are compulsory

2. All questions carry equal marks

3. Draw neat labelled diagram wherever necessary

Q1. A) Fill in the blanks (05)

a) Flammable liquid has flash point less than _____ °C.

(37.8, 50.4, 20)

b) _____ revised Celsius scale.

(J.P Christine, Gabriel Daniel, Thomson Kelvin)

c) _____means a physical attachment of the compound on the surface of the stationary phase

(Adsorption, Absorption, Diffusion)

d) _____coined the term chromatography

(Mikhail Tswett, Plank, Robert Hook)

e) _____are being used to create transgenic fishes with enhanced resistance to cold temperatures and freezing.

(AFPs, FPs, GH)

Q1.B) Match the column (05)

A	B
a. Data	i. Electrophoresis
b. Fish	ii. Genetic Disease
c. Haemophilia	iii. Transgenic Salmon
d. Whatmam filter paper	iv. Set of Observed Values
e. AGE	v. Chromatography

Q1.C) State whether true or false (05)

a) One Kilometre is equals to 1000m.

b) Resolution factor is the distance travelled by the solvent /distance travelled by the solute.

c) Colorimetric technique works on the basis of Beer Lambert's law.

d) Insulin is used to treat type-II diabetes mellitus.

e) SCID is an example of ex- vivo gene therapy.

Q1.D) Answer in one sentence (05)

a) What is the full form of GLP?

b) Define retardation factor

c) Define electrophoresis

d) Define biotechnology

e) What is RFLP?

Q2.A) Answer the following (any one) (10)

a) What is mode? How do you calculate mode for ungrouped and grouped data?

b) Explain random sampling and give its significance.

Q2.B) Answer the following (any two) (10)

a) Write a note on percent solution and its type.

b) What is pie diagram? Give the formula to calculate angles of degree for different components.

c) Write a note on Good laboratory practices

d) Define Normality. How would you prepare 1 litre of 2N NaOH solution? (Mol. Wt. of NaOH=40)

Q3.A) Answer the following (any one) (10)

a) What is transgenesis? Explain any two methods of transgenesis.

b) Explain cloning with an example.

Q3.B) Answer the following (any two) (10)

a) Give the applications of recombinant DNA in medicine.

b) Explain the scope of biotechnology.

c) Describe green genes and give its applications.

d) Discuss the ethical issues of cloning.

Q4. Answer the following (any two) (20)

a) Explain the different types of chromatography

b) Explain the principle and applications of electrophoresis

c) Explain the principle and applications of centrifugation

d) Give the applications of dissecting and compound microscope

Q5) Write short notes on (any four) (20)

a) Chemical hazards

b) Molarity and molality

c) Principle of chromatography

d) Applications of pH meter

e) Applications of biotechnology in fishery

f) Gene therapy