SG - 121

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, January - 2023
MATHEMATICS
DSC - C5 : Real Analysis - I (Paper - V)
Sub. Code: 73300

Day and Date : Monday, 30 - 01 - 2023 **Total Marks : 50**

Time : 3.00 p.m. to 5.30 p.m.

Instructions : **1)** **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Select the correct alternative for each of the following: **[10]**

a) If $f : R \to R$ is given by $f(x) = |x|$ then f is

i) injection ii) surjection
iii) bijection iv) none of the above

b) The set $\{x \mid x < 7\}$ is the interval

i) (0, 7) ii) $(-\infty, 7)$
iii) [0, 7] iv) $(-\infty, 7]$

c) If A = {1, 2, {3}, (4, 5)} then the number of elements in it is

i) 3 ii) 4
iii) 5 iv) 2

d) A function $f : A \to B$ is called a one-one correspondence between A and B, if _____.

i) f is one-one but not onto ii) f is one-one and onto
iii) f is not one-one but onto iv) f is neither one-one nor onto

e) The set of rational numbers is _____.

i) Countable ii) Uncountable
iii) Finite iv) None of these

f) If A is any non-empty subset of R that is bounded below, then A has ____ in R.

i) A greatest lower bound ii) Upper bound
iii) Least upper bound iv) None of these

P.T.O.

g) Let f be a real valued function described by $f(x)=x^2(-\infty<x<\infty)$. Then $f([0, 3)) =$ ____

i) (0, 9) ii) (0, 9]
iii) [0, 9) iv) [0, 9]

h) Every 1-1 correspondence is _____.

i) one-one ii) onto
iii) countable iv) all i), ii), iii)

i) The open interval (0, 1) is _____.

i) Countable uncountable ii) Uncountable
iii) Neither countable nor iv) Finite

j) The Cartesian product of two countable sets is _____.

i) Countable uncountable ii) Uncountable
iii) Neither countable nor iv) Finite

Q2) Attempt <u>any two</u> of the following. **[20]**

a) Define inverse function. If $f:A\to B$ and $g:B\to C$ are functions and let H be a subset of C. Then show that $(g^0 f)^{-1}$ (H) = f^{-1} (g^{-1} (H)).

b) State Principal of Mathematical Induction. By using Mathematical induction, prove that $1+2+3.....+n=\frac{n(n+1)}{2}$.

c) Prove that the set of all rational numbers is countable.

Q3) Attempt <u>any four</u> of the following. **[20]**

a) If A and B are any two sets then prove that $(A\cup B)'=A'\cap B'$.

b) If $f;R\to R$ be a function defined by $f(x) = 3x + 7$, then show that the function f is one-one and onto. Also find f^{-1}.

c) Prove that for $n\in N$, $a^n - b^n$ is divisible by a - b for all $n\in N$.

d) Prove that $n < 2^n$ for all $n\in N$.

e) Prove that the sets of even and odd natural numbers are countable.

f) Find all values of x satisfying $3x-1=|x-7|$.

✠ ✠ ✠

SG - 127

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) (Revised) Examination, February - 2023
MICROBIOLOGY (Paper-V)
DSC-C25: Microbial Physiology & Metabolism
Sub. Code: 73307

Day and Date: Wednesday, 01 - 02 - 2023 **Total Marks : 50**

Time : 2.30 p.m. to 4.30 p.m.

Instructions : **1)** **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Rewrite the sentences by selecting correct alternative given below: **[10]**

a) Microbial growth curve shows a ____ curve.
i) Bell shape ii) Hypertonic
iii) Parabolic iv) sigmoidal

b) The organism that grows at basic pH (8 to 11) is called as _____
i) Neutrophiles ii) Acidophiles
iii) Alkalophiles iv) None of these

c) The growth rate and death rate are equal in ____ phase.
i) log ii) lag
iii) stationary iv) Death

d) Shrinkage of cell due to hypertonic solution is known as _____.
i) Plasmoptysis ii) Plasmolysis
iii) Bursting iv) Swelling

e) In Preparatory phase of glycolysis consumes _____ molecules for glucose degradation.
i) GTP ii) ATP
iii) $NADH_2$ iv) None of these

f) _____ is the general term for the anaerobic degradation of glucose or other organic nutrients.
i) Fermentation
ii) Respiration
iii) Oxidative phosphorylation
iv) Photophosphorylation

P.T.O.

g) Reduced respiratory activity occurs at _____ temperature.

i) high ii) low

iii) medium iv) none of these

h) _____ is an example of hyperthermophiles.

i) *E.coli* ii) *Staphylococcus*

iii) *archea* iv) *Proteus*

i) _____ example of UV resistant bacteria.

i) *Micrococcus radiodurans*

ii) *Boda marina*

iii) *Halophilusendolithus*

iv) *E.coli*

j) In _____ transport mechanism solute is chemically altered.

i) Diffusion ii) Active transport

iii) Group translocation iv) Passive diffusion

Q2) Long answers (Attempt any two) **[20]**

a) Define growth. Enlist and describe different phases of growth.

b) What is oxidative phosphorylation? Explain ATP generation by oxidative phosphorylation.

c) Give an account on transport across cell membrane.

Q3) Short Notes: (Attempt any four) **[20]**

a) Effect of heavy metal.

b) Direct microscopic count.

c) Synchronous growth.

d) Hetero lactic acid fermentation.

e) Significance of TCA.

f) Chemostat.

SG-132

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, February-2023
MICROBIOLOGY
DSC C26 : Applied Microbiology (Paper - VI)
Sub. Code : 73307

Day and Date : Thursday, 02 - 02 - 2023 **Total Marks : 50**

Time : 2.30 p.m. to 4.30 p.m.

Instructions : **1)** **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Rewrite the following sentences by selecting correct answers from given alternatives: **[10]**

a) The coughing, sneezing and forceful expiratory activities directly releases _____.

i) dust ii) droplets

ii) droplet nuclei iv) infectious dust

b) _____ remain suspended in air for longer duration and settles far away from the source of their release.

i) Infectious Dust ii) Droplets

iii) Droplet nuclei iv) Good dust

c) Differentiation of fecal and nonfecal coliforms is done by _____ test.

i) MPN ii) SPC

iii) membrane filtration iv) IMViC

d) α-naphthol solution is used in detection of _____

i) acid ii) acetoin

iii) citrate iv) indole

e) _____ test is used to check the efficiency of milk pasteurization

i) Phosphatase ii) MPN

iii) Eijkman iv) MBRT

P.T.O.

f) Yellow color change in milk is caused by _____.

i) *Pseudomonas syncyanea* ii) *Pseudomonas putrefaciens*

iii) *Serratia marcescens* iv) *Pseudomonas synxantha*

g) The selected microbial strain for fermentation must give _____ yield of the fermentation product.

i) high ii) lower

iii) lowest iv) low

h) Vinegar production is best example of _____ fermentation

i) Dual ii) Batch

iii) Continuous iv) Batch and dual

i) _____ metabolites are involved in normal growth, development and reproduction.

i) Primary ii) Secondary

iii) Tertiary iv) Quaternary

j) The precursor added in vitamin B12 fermentation is _____.

i) $MoCl_2$ ii) $CaCl_2$

iii) $CoCl_2$ iv) $ZnCl_2$

Q2) Attempt any TWO of the following: **[20]**

a) Explain municipal water purification process and its significance.

b) Define screening. Explain primary screening programme.

c) What is fermentor? Describe in detail typical fermentor with reference to its parts and associated functions.

Q3) Write a short note on any FOUR. **[20]**

a) Infectious dust.

b) Qualitative detection of coliforms.

c) Enlist sources of microorganisms in milk.

d) Dual and multiple fermentations.

e) Precursors used in fermentation.

f) Growth factors used in fermentation media.

♦ ♦ ♦

SG-116

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II), (Semester - III) Examination, January -2023
ZOOLOGY
DSC C15 : Animal Diversity-II (Paper-V)
Subject Code: 73304

Day and Date : Wednesday, 25 - 01 - 2023 **Total Marks : 50**
Time : 10.30 a.m. to 12.30 p.m.

Instructions : **1)** **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labelled diagrams wherever necesary.**

Q1) Select the correct alternative from the following. **[10]**

a) Which organism of the following is not urochordate?

i) Amphioxus ii) Phrynosoma

iii) Herdmania iv) Doliolum

b) Amphioxus obtains food by_____

i) Biting and chewing ii) Ciliary filter feeding

iii) Scavenging iv) Predation

c) The tail fin in scoliodon is described as____

i) Heterocercal ii) Homocercal

iii) Diphycercal iv) Protocercal

d) The tail fin in bony fishes is described as_____

i) Protocercal ii) Homocercal

iii) Diphycercal iv) Heterocercal

e) Which of the following characters is true for birds____

i) Capable of flight ii) Body covered by feathers

iii) Pneumatic bones iv) All of the above

P.T.O.

f) Eggs are large, mega-lecithal and calcareous shell is characteristic of_____
   i) Amphibia ii) Aves
   iii) Reptile iv) Mammal

g) Among the mammals the ____possess primitive characteristics like egg laying
   i) Prototherians ii) Eutherians
   iii) Metatherians iv) Placetotherian

h) _____are the pouched mammals.
   i) Monotrems ii) Marsupilians
   iii) Prototherians iv) Placentotherians

i) With reference to parental care in Amphibians, construction of nurseries is shown by_____
   i) Frog ii) Hyla
   iii) Salamander iv) Ichthyophis

j) Even after attaining sexual maturity, larval characters are retained. It is known as_____
   i) Phylogenesis ii) Neoteny
   iii) Parthenogenesis iv) Ontogenesis

Q2) Attempt any two of the following. **[20]**

a) Give salient features of Agnatha and add a note on Ostracodermi.
b) Give an account of salient features of class Amphibia and add a note on order anura.
c) Give an account on the distinguishing characteristics of venomous and non-venomous snakes.

Q3) Write short note on (any four) **[20]**

a) Gill structure of *Labeo*
b) General characters of class Leptocardi.
c) Digestive glands of birds.
d) Insectivorous Mammals.
e) Salient feature of Myxine.
f) Distinguish between cartilaginous & bony fish.

SG - 118

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, January- 2023

ZOOLOGY

DSC-C16 : Biochemistry (Paper-VI)

Sub. Code: 73304

Day and Date : Friday, 27 - 01 - 2023 **Total Marks : 50**

Time : 10.30 a.m. to 12.30 p.m.

Instructions : **1)** **All questions are compulsory.**
2) **Draw a neat labeled diagrams wherever necessary.**
3) **Figures to the right indicate full marks.**

Q1) Choose correct alternative from the following: **[10]**

a) The nitrogen bases found in DNA are asenine, cytosine, guanine, and _____.

i) uracil ii) thymine
iii) inosine iv) pseudouridine

b) The sugar molecule and phosphate group bonds is called _____ bonds.

i) phosphodiester bonds ii) glycosidic bonds
iii) ester bonds iv) covalent bonds

c) The structure of DNA was first proposed by ____ in 1953.

i) Embden & Meyerhof ii) Watson and Crick
iii) Morgan & Mendel iv) Franklin & Lamarck

d) The removal of amino group from the amino acids is ____.

i) transamination ii) deamination
iii) glycogenolysis iv) glycolysis

e) Synthesis of carbamoyl phosphate takes place in the _____ of the liver cells.

i) nucleus ii) mitochondria
iii) Iysosomes iv) Golgi complex

f) The first enzyme discovered was amylase, by _____.

i) Anselem Payen ii) F.W. Kuhne
iii) James Sumner iv) Edward Buchner

P.T.O.

g) In enzyme reaction, _____ is also called end-product inhibition.
   i) Competitive inhibition
   ii) Non Competitive inhibition
   iii) Feedback inhibition
   iv) Allosteric Modulation

h) _____ is the net gain of ATP during the conversion of glucose to pyruvate.
   i) 2 ATP
   ii) 4 ATP
   iii) 6 ATP
   iv) 1 ATP + 1 GTP

i) The enzymes of TCA cycle are located in _____
   i) Ribosomes
   ii) endoplasmic reticulam
   iii) Golgi complex
   iv) matrix of mitochondria

j) The multiple forms of enzyme in the same organism and with similar activity are _____.
   i) Allosteric enzyme
   ii) Isoenzyme
   iii) Co enzymes
   iv) Pro-Enzyme

Q2) Attempt **any TWO** of the following. **[20]**

a) What are nucleic acids? Give the molecular structure of DNA.

b) Explain the various reactions involved in the Kreb's cycle.

c) Describe factors influencing enzyme activity.

Q3) Solve **any four** of the following: **[20]**

a) Structure of t-RNA

b) FAS Complex

c) Deamination

d) Lock & key hypothesis

e) Co-Enzymes

f) Significance of ornithine cycle

SG - 120

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, July - 2022
BOTANY
DSC D13 : Embryology of Angiosperms (Paper - V)
Sub. Code: 73303

Day and Date : Friday, 08 - 07 - 2022 **Total Marks : 50**

Time : 11.30 a.m. to 2.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat and labeled diagrams wherever necessary.**

Q1) Rewrite the following sentences by selecting correct answer from given alternatives. **[10]**

a) Calatropis is pollinated by _____.

i) wind ii) water

iii) insect iv) birds

b) In _____ both the male gametes take part in the fertilization process.

i) Megasporogenesis ii) Double fertilization

iii) Syngamy iv) Microsporogenesis

c) _____ is straight ovule.

i) Orthrotropous ii) Anatropous

iii) Circinotropous iv) Amphitropous

d) Water pollinated plants are called as _____.

i) Anemophilous ii) Ornithophilous

iii) Hydrophilous iv) Entomophilous

e) In angiosperms after fertilization zygote is _____.

i) Haploid ii) Diploid

iii) Triploid iv) Tetraploid

P.T.O.

f) The body of ovule is completely inverted in 180 degree _____ ovule.

i) Orthrotropous ii) Anatropous

iii) Circinotropous iv) Amphitropous

g) _____ is fibrous tissue in anther

i) Epidermis ii) Tapetum

iii) Endothecium iv) Intine

h) Transfer of pollen grains from an anther to the stigma of a flower is known as _____.

i) Pollination ii) Fertilization

iii) Megasporogenesis iv) Microsporogenesis

i) Cocus nucifera is the classical example of _____ endosperm

i) Helobial ii) Cellular

iii) Nuclear iv) Apomixis

j) The endospermic nucleus is _____.

i) Haploid ii) Diploid

iii) Triploid iv) Tetraploid

Q2) Attempt any two of the following **[20]**

a) Define pollination? Explain types of pollination in brief with suitable example.

b) Describe fertilization and entry of pollen tube in angiosperm.

c) Explain types of endosperms in angiosperms.

Q3) Attempt any four of the following. **[20]**

a) Flower structure.

b) Pollination in Vallisneria

c) Stem nature of flower

d) Double fertilization its and significance

e) Monosporic and Bisporic embyo sac in angiosperms

f) Sketch and lable terasporangiate anther.

✠ ✠ ✠

SG - 122

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, January - 2023
BOTANY
DSC-C14 : Plant Physiology (Paper - VI)
Sub. Code : 73303

Day and Date : Tuesday, 31 - 01 - 2023 **Total Marks : 50**
Time : 10.30 a.m. to 12.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled diagrams wherever necessary.**

Q1) Select the correct alternative from the following. **[10]**

a) The shrinkage of protoplasm due to loss of water is called _____.

i) Exoosmosis ii) Endoosmosis
iii) Plasmolysis iv) Diffusion

b) Transpiration mainly occurs through _____.

i) Root ii) Stem
iii) Leaf iv) Flower

c) During day time starch is converted in to glucose phosphate by enzyme _____.

i) Phosphatase ii) Carboxylase
iii) Phosphorylase iv) Catalase

d) Donnan equillium is _____ uptake of mineral.

i) Active ii) Passive
iii) Positive iv) Negative

e) _____ are known as protoplasmic elements.

i) S, P, N ii) N, P, K
iii) C, N, O iv) Ca, N, P

f) Blossom end rot disease is due to deficiency of _____.

i) Phosphorus ii) Iron
iii) Magnesium iv) Calcium

P.T.O.

g) _____ is important constituent of chlorophyll.

i) Boron ii) Zinc

iii) Magnesium iv) Calcium

h) Phycocyanins are presnet in _____ algae.

i) Blue Green ii) Red

iii) Green iv) Yellow

i) The carbon dioxide acceptor in CAM plants is _____.

i) Malic acid ii) Oxalo acetic acid

iii) Pyruvic acid iv) Phosphoenol pyruvic acid

j) Maize is an example of _____.

i) SDP ii) LDP

iii) DNP iv) MDP

Q2) Attempt any two of the following. **[20]**

a) Give an account of passive uptake of minerals.

b) What is photophosphorylation? Explain the cyclic and noncyclic photophosphorylation.

c) What is photoperiodism? Give the classification of plants based on photoperiodism.

Q3) Attempt any four of the following. **[20]**

a) Osmosis

b) Starch Sugar hypothesis

c) Physiological role of calcium

d) Significance of C4 Cycle

e) Practical applications of GA

f) Applications of vernalization

⌘⌘⌘

SG-108

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, February-2023
CHEMISTRY
DSC - C3 : Physical Chemistry (Paper - V)
Sub. Code : 73302

Day and Date : Friday, 03 - 02 - 2023 **Total Marks : 50**

Time : 10.30 a.m. to 12.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat diagrams and give equations wherever necessary.**
4) **Use of scientific calculator and logarithmic table is allowed.**

Q1) A) Answer the following in one sentence. **[5]**

a) Give mathematical statement of Hittorf's rule.

b) What is energy of activation?

c) Geiger - Muller counter is based on which property of nuclear radiation.

d) Write mathematical equation of molar refractivity.

e) What are different types of adsorption.

B) Choose the most correct alternative for each of the following and rewrite the sentences. **[5]**

a) The device which is used to determine the surface tension of liquid is known as _____.

i) refractometer ii) conductometer

iii) voltmeter iv) stalagmometer

b) On dilution, equivalent conductivity _____

i) increases ii) decreases

iii) tends to infinity iv) remains same

c) Langmuir's adsorption isotherm takes the form of Freundlich adsorption isotherm _____

i) at low pressure ii) at moderate pressure

iii) at high pressure iv) at high temperature

P.T.O.

d) Half life of third order reaction, $t_{1/2}$ = _____

i) k / 0.693 ii) 0.693 / k

iii) $3 / 2ka^2$ iv) $2ka^2/3$

e) The radioactive disintegration is an example of _____ order reaction.

i) first ii) third

iii) second iv) fourth

Q2) Attempt any two of the following: **[20]**

a) State Kohlrausch law. Give its mathematical equation. Discuss its applications.

i) To find the relation between ionic conductance and transport number.

ii) To determine degree of dissociation of weak electrolyte.

b) What is third order reaction? Mention any two examples of it. Derive kinetic equation of third order reaction, $3A \rightarrow$ products.

c) Describe the principle, construction and working of Abbe's refractometer.

d) What is adsorption? Derive the mathematical expression for Langmuir adsorption isotherm.

Q3) Answer any four of the following: **[20]**

a) In moving boundary experiment with 0.1 mol dm^{-3} KCI solution using 0.65 M LiCl solution as an indicator electrolyte, a constant current of 5.892mA was passed for 35.5 minutes. The boundary was observed to move through 5.6 cm in a tube of 1.142×10^{-5} m^2 cross section. Calculate transport number of K^+ an $C1^-$ ions.

b) What are the factors affecting on adsorption? Explain in brief.

c) Mention types of radioactive equilibrium and explain any one of them with examples.

d) The range of α - particle from a particular radioactive element is 4.3 cm. Calculate the decay constant of radioactive element, if A = 49.3 and B = -40.5 with half - life in years.

e) Explain the conductometric titration of strong acid with strong base.

f) Describe Ostwald's Viscometer method for finding the viscosity of liquid.

♦ ♦ ♦

SG - 109

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) (Revised) Examination, February - 2023

CHEMISTRY

DSC-C4 : Industrial Chemistry (Paper-VI)

Sub. Code: 73302

Day and Date: Saturday, 04 - 02- 2023 **Total Marks : 50**

Time : 10.30 a.m. to 12.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Draw a neat labeled diagram and give equestions wherever necessary.**

Q1) A) Answer the following in one sentence. **[5]**

a) Which are the raw materials obtained from lithosphere?

b) Define the term ore.

c) What is electrochemical series?

d) What is mean by zwitterionic detergent.

e) Sulphate pulping is also known as?

B) Select the correct alternative and rewrite the sentence again. **[5]**

a) The number of ____ of solute present in one dm^3 of solution is known as molarity

i) gram equivalents ii) equivalents

iii) moles iv) grams

b) The reboiler is also called_____

i) distillation flask ii) condenser

iii) receiver iv) none of the above

c) The standard reduction electrode potential of Zn is _____ iron.

i) equal to ii) less than

iii) greater than iv) none of these

P.T.O.

d) In craft pulping for digestion chemicals used are _____.

i) Na_2SO_4 & NaOH ii) MgO & NaOH

iii) Na_2CO_3 & NaOH iv) both (i) & (iii)

e) _____ is a example of zwitterionic surfactant.

i) Deriphat ii) teepol

iii) Igepon-T iv) both (i) & (ii)

Q2) Attempt any TWO of the following. **[20]**

a) Explain any five methods of protection of metals from Corrosion.

b) What is distillation? Mention different types of distillation. Explain any one of them.

c) Explain chemical and mechanical process used in pulp industry.

Q3) Attempt any FOUR of the following. **[20]**

a) What are the advantages and disadvatages of detergent?

b) Describe the cleansing action of soap.

c) Explain the features of good paper industry.

d) Describe the metallic coating method for metal protection from corrosion.

e) 25 mL of 3.0 M NaOH is mixed with 75 mL of 4.0 M NaOH. If the volume are additive, calculate the molarity of final mixture of mixed solution.

f) Define the following terms.

i) Normality

ii) Molarity

iii) Molatity

iv) Parts per Million Solution

v) Parts per Billion Solution

SG-110

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, January-2023

PHYSICS

DSC-C1: Thermal Physics & Statistical Mechanics - I (Paper - V)

Sub. Code : 73301

Day and Date : Monday, 23 - 01 - 2023 **Total Marks : 50**

Time : 2.30 p.m. to 4.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Use of scientific calculator is allowed.**
3) **Figures to the right indicate full marks.**
4) **Draw neat labelled diagrams wherever necessary.**

Q1) Select the correct alternative from the following. **[10]**

a) Mechanical equilibrium refers to the uniformity of _____
   i) Pressure ii) Volume
   iii) Temperature iv) Entropy

b) During isothermal process _____ remains constant.
   i) volume ii) temperature
   iii) pressure iv) composition

c) In an irreversible process, entropy _____
   i) increases ii) decreases
   iii) remains unchanged iv) none of these

d) Entropy of the universe tends towards _____
   i) maximum ii) a constant
   iii) minimum iv) a negative value

e) The need for the finite diameter or size of the gas molecule was assumed by
   i) Maxwell ii) Van der Waal
   iii) Boltzmann iv) Clausius

f) The difference in molecular concentration is gases gives rise to _____
   i) thermal conductivity ii) diffusion
   iii) viscosity iv) none of these

P.T.O.

g) The dependence of coefficient of viscosity η on the higher absolute temperature T of a gas is _____

i) $\eta \alpha T$ ii) $\eta \alpha T^{1/2}$

iii) $\eta \alpha 1/T$ iv) $\eta \alpha T^2$

h) In Fahrenheit scale the length between two fixed points is divided into _____ equal parts.

i) 100 ii) 180

iii) 125 iv) 150

i) If a diatomic gas molecule has translational, rotational and vibrational degrees of freedom, then the ratio of C_p/C_v, is _____

i) 1.29 ii) 1.40

iii) 1.33 iv) 1.67

j) Viscosity of a gas is due to transport of _____

i) momentum ii) energy

iii) mass iv) none of these

Q2) Attempt any two of the following. **[20]**

a) What is fundamental interval of temperature? Explain Fahrenheit, Rankine and Reaumer scales of temperature. State interconversion formula for these scales.

b) Derive expression for work done during isothermal and adiabatic process?

c) Explain working of the carnot's heat engine.

Q3) Attempt any four of the following. **[20]**

a) Give the principle and theory of platinum resistance thermometer.

b) State advantages and disadvantages of thermoelectric thermometer.

c) State law of equipartition of energy and for monoatomic gas. Show that the ratio of specific heats of a gas is 5/3.

d) Give various statements of second law of thermodynamics.

e) Derive an expression for work done during isothermal process.

f) Write note on isothermal process.

♦ ♦ ♦

SG - 113

Total No. of Pages : 2

Seat No.	

B.Sc. (Part - II) (Semester - III) (CBCS) Examination, January - 2023
PHYSICS (Paper-VI)
DSC-C2 : Waves and Optics - I
Sub. Code: 73301

Day and Date : Tuesday, 24 - 01 - 2023 **Total Marks : 50**

Time : 10.30 a.m. to 12.30 p.m.

Instructions : **1) All questions are compulsory.**
2) Figures to the right indicates full marks.
3) Draw a neat labelled diagram wherever necessary.

Q1) Select Correct Alternative: **[10]**

a) The relation between velocity (V) of sound wave, frequency (n) and wavelength (λ) is _____.
   i) V= n+λ ii) V=nλ
   iii) V=n–λ iv) V=n/λ

b) Beats are produced due to superposition of two _____.
   i) harmonic oscillator
   ii) collinear oscillations
   iii) oscillations with slightly different frequencies
   iv) linear oscillations

c) Principle of superposition is obeyed by _____.
   i) homogeneous equations ii) linear equations
   iii) homogeneous and linear equations iv) non-linear equations

d) If (S) is actual surface area, (a) is coefficient of absorption then effective absorbing area (A) is _____.
   i) S/a ii) aS
   iii) (a–S) iv) a/S

e) Phase Velocity of a wave is v = _____.
   i) w/k ii) k/w
   iii) dw/dk iv) dk/dw

f) Lubrication results due to _____ property of fluid.
   i) surface tension ii) viscosity
   iii) conductivity iv) resistivity

P.T.O.

g) Sabine in his experiment on reverberation time used organ pipe of a frequency _____.

i) 612 Hz ii) 512 Hz
iii) 315 Hz iv) 412 Hz

h) Period of energy transfer (T) in coupled oscillations is = _____.

i) $2\pi/(\omega_1-\omega_2)$ ii) $\pi/(\omega_1-\omega_2)$
iii) $4\pi/(\omega_1-\omega_2)$ iv) $3\pi/(\omega_1-\omega_2)$

i) The Unit of the air pressure is _____.

i) torr ii) meter
iii) second iv) ampere

j) The tolerable leak rate is _____ of pumping speed (S) and operating pressure (P)

i) product ii) summation
iii) subtraction iv) division

Q2) Long answer Type Questions (Any Two) **[20]**

a) Discuss analytically, the superposition of two collinear harmonic oscillations having equal frequencies and hence obtain an equation of resultant displacement, amplitude and phase constant.

b) Derive an expression for two angular frequencies involved in coupled oscillation of two simple pendulum.

c) What is coefficient of viscosity of liquid? Explain Poiseuille's experiment of determining rate of flow of liquid through a capillary.

Q3) Short Answer Type Questions (Any Four) **[20]**

a) Write a note on optimum reverberation time.

b) Give different methods of producing low pressure.

c) Write a note on musical notes.

d) State any five properties of ultrasonic waves.

e) Explain the terms

i) Streamline flow
ii) Turbulent flow

f) Discuss normal modes of vibration of a stretched string.