

Course Code: SOS-B-PH201

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

B.Sc. (Hons.)-Physics 2nd Semester [03UG021]



Department of Physics, School of Science

Electricity and Magnetism

Time: 2 Hrs.

Max. Marks: 50

Note:

	M	CO	KL
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	What is electric susceptibility? Derive the relation $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$, where \vec{D} is displacement vector, \vec{E} is electric field, \vec{P} is polarization vector and ϵ_0 is permittivity of free space.	5	CO4 4	K3
	b.	What is Gauss law in electrostatic? Consider a uniformly charge sphere of radius R and find out the electric field produced at a point r outside the sphere.	5	CO1	K2
	c.	Define electric field intensity, electric potential and explain relation between them.	5	CO1	K2
	d.	Discuss polar and non-polar dielectrics with examples. How is dielectric constant related to temperature?	5	CO4	K3
	e.	Explain orientation polarization with suitable diagram. Give an example of orientation polarization.	5	CO4	K3

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Find the potential of a uniformly charged spherical shell of radius R for point (a) inside and (b) outside it using Gauss's law.	10	CO1	K3
	b.	Prove that $\vec{E} = -\vec{\nabla}V$, where E is electric field intensity and V is electric potential	10	CO1	K3
	c.	Derive Clausius-Mossotti equation and discuss its applications.	10	CO4	K2
	d.	Find the capacitance of a spherical capacitor filled with a dielectric of dielectric constant K.	10	CO4	K3

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OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

B.Sc. (Hons.)-Physics 2nd Semester [03UG021]

Department of Physics, School of Science

Analog Systems and Applications

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]


1	a.	Describe how the p-n junction is formed and barrier potential. Draw the energy level diagrams of p-n junction diode under forward and reverse bias.	5	CO1	K3
	b.	Discuss the differences between a photodetector and a solar cell.	5	CO5	K2
	c.	Consider an intrinsic semiconductor with effective mass of hole equals to the double of the effective mass of electron. Determine the position of Fermi level at room temperature and also present it in energy level diagram. Given: Thermal energy (kT) at room temperature = 25 meV	5	CO1	K2
	d.	Explain the full wave bridge rectifier using suitable diagrams. In a half wave rectifier, a 10000 μ F filter capacitor is added across the load resistor. The voltage across the secondary terminal of transformer is 230 V (rms). Determine the dc output voltage and load current.	5	CO2	K3
	e.	Sketch the circuit diagram of Zener diode as voltage regulator and describe its working.	5	CO2	K3

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	What is light emitting diode (LED)? Describe its working using device structure and energy level diagram. Discuss why Si or Ge is not used in LED.	10	CO5	K3
	b.	Describe the working and I-V characteristics of p-n junction diodes in forward and reverse bias.	10	CO2	K3
	c.	Explain the construction and working of a Schottky diode and point out the differences between Schottky and p-n junction diodes. Is it possible to fabricate Schottky diode solar cell?	10	CO5	K2
	d.	What are p-doped and n-doped semiconductors? Describe them with suitable diagrams. Sketch the Fermi level in energy level diagram of n-doped semiconductor at 1000 K.	10	CO1	K2

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		Course Code: SOS-B-CH201			
		O P JINDAL UNIVERSITY Mid-Semester Examination, May-2023 B.Sc. 2nd Semester			
					
		CC III: Organic Chemistry I [03 UG 023]			
Time: 2 Hrs.		Max. Marks: 50			
Note:					
		M	CO	K	
			L		
Section A (10 marks)					
All Questions are compulsory [05 x 02 marks=10 marks]					
1	a.	To write any four organic compounds name and structure.	02	CO 1	K1
	b.	To draw the structure, bond angle and example of sp ³ hybridization.	02	CO 1	K1
	c.	What do you mean by free radical?	02	CO 3	K1
	d.	What is aromaticity?	02	CO 1	K1
	e.	Give any organic reaction with suitable example.	02	CO 1	K1
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	To write notes on: a) Carbocation b) Inductive effect	04	CO 3	K1
	b.	What do you mean by hybridization with their types and suitable examples.	04	CO 1	K1
	c.	What is electronic displacement effect? To write resonance effect and mesomeric effect.	04	CO 3	K1
	d.	To write organic compounds name, their classifications with.	04	CO 1	K1
	e.	To describe Huckels Rule for aromatic character.	04	CO 1	K1
Section C (24 marks)					
Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	Explain electrophilic aromatic substitution: halogenation, nitration, sulphonation.	08	CO 3	K1
	b.	Define organic reactions and their mechanism: Addition, Elimination and Substitution reactions.	08	CO 1	K1
	c.	What do you mean by Homolytic and Heterolytic fission with suitable examples? Explain Carbocation with their types and their relative stability.	08	CO 3	K2
	d.	To write notes on: a) Carbanion b) Hyperconjugation c) Free Radical	08	CO 3	K1
	e.	Define Organic acids and bases with their relative strength.	08	CO 1	K1

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Course Code: **SOS-B-CH-202****OP JINDAL UNIVERSITY**

Mid Semester Examination, May-2023

B.Sc. 2nd Semester [03UG022]

Department of Chemistry

Physical Chemistry - II

Time: 2 Hrs.

Max. Marks: 50

Note: All questions are compulsory

M	CO	K	L
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	What is internal energy of the system? How it is related to enthalpy of system?	5	CO2	2
	b.	Define function and differentiate path function and state function?	5	CO2	1
	c.	Can you differentiate intensive and extensive properties by giving some examples?	5	CO1	3
	d.	Define enthalpy of a system ? Explain the enthalpy of neutralization?	5	CO1	1
	e.	Define zeroth law of thermodynamics and first law of thermodynamics	5	CO1	1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]


2	a.	Prove that enthalpy is state function. Explain the effect of temperature on enthalpy?	10	CO2	2
	b.	Calculate ΔU , ΔH , q , w in isothermal and adiabatic expansion of gas	10	CO1	2
	c.	Describe the effect of temperature by using Kirchoff's equation	10	CO1	2
	d.	Calculate the bond dissociation energy for CH_4 molecule	10	CO2	3

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Course Code: SOS-B-MA201					
OP JINDAL UNIVERSITY					
Mid Semester Examination, May-2023					
B. Sc. (Hons) 2 nd Semester [03UG023]					
B.Sc. (Hons.) Mathematics					
REAL ANALYSIS (ANALYSIS I)					
Time: 2 Hrs.			Max. Marks: 50		
Note:					
			M	CO	KL
Section A (20 marks)					
Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	Define Neighborhood of a point and Bounded set with examples .Also check the Boundedness of $S = \left\{ \frac{1}{x}, x \in N \right\}$	5	1	2
	b.	Prove that if infimum of set S of R i.e. $S \subset R$ if exist then it is unique.	5	1	2
	c.	Show that the interval (0,1) in set of Real number is uncountable.	5	1	2
	d.	Prove that every open interval is open set.	5	2	2
	e.	Define interval and explain open interval and closed interval with example.	5	2	2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain Algebraic and Order properties of R (Real number).	10	1	3
	b.	Prove that subset of Countable Set is countable AND Union of Countable collection of countable set is countable.	10	1	3
	c.	Prove that between any two real number there exist infinitely many rational number	10	2	3
	d.	State and prove Archimedean property of real number AND prove that a point is said to be limit point if and only if every neighborhood of point contains infinitely many member of the set other than point.	10	2	3

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Roll No.		Course Code: [SOS-B-MA202]			
O P JINDAL UNIVERSITY				 UNIVERSITY OF STEEL TECHNOLOGY AND MANAGEMENT	
Mid Semester Examination, April-2023					
B. Sc. (Hons., Mathematics) 2 nd Semester [01UG010]					
School of Science, Department of Mathematics					
Ordinary Differential Equation					
Time: 2 Hrs.		Max. Marks: 50			
Note:					
		M	CO	KL	
Section A (20 marks)					
Answer any 4 questions [05 x 04 marks=20 marks]					
1	a.	Solve $2xy' = 10x^3y^5 + y$.	05	CO2	K1
	b.	Solve $(x^2y^2 + xy + 1)ydx + (x^2y^2 - xy + 1)xdy = 0$	05	CO2	K1
	c.	Solve $(px - y)(x + py) = 2p$.	05	CO2	K1
	d.	In a population, the initial population is 100. Suppose the population can be modeled using the differential equation $\frac{dx}{dt} = 0.2x - 0.001x^2$ with a time step of one month. Find predicted population after 2 months.	05	CO3	K2
	e.	Write the Case study on Lake Burley Griffin.	05	CO3	K1
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Uranium disintegrates at a rate proportional to the amount then present at any instant. If M_1 and M_2 grams of uranium are present at times T_1 and T_2 respectively, find the half life of uranium.	10	CO3	K2
	b.	Let in a lake, the pollution level is 5%. If the fresh water at the rate of 10000 litres per day is allowed to enter and same amount of water leaves the lake. Find the time when pollution level is 2.5% if volume of the lake is 50000 litres. Further, if safety level is 0.1%, then after how much time, water is suitable for drinking.	10	CO3	K2
	c.	Define with the help of compartmental diagram and Solve the Drug Assimilation model for case of single Cold Pill.	10	CO3	K2
	d.	Solve $p^2 + 2p\cot x = y^2$.	10	CO2	K1

Course Code: SOS-B-BT201

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

B.Sc. (H) 2nd Semester [03UG024]



Biotechnology

Mammalian Physiology

Time: 2 Hrs.

Max. Marks: 50

Note: 1. Attempt all the questions of a section in a same place.
2. Draw diagram wherever required.

M	CO	KL
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]


1	a.	Write the Chemical composition of any three from the following: i. Saliva ii. Bile iii. Gastric Juice iv. Pancreatic Juice v. Intestinal Juice	5	1	1
	b.	Explain in brief the laws which govern the exchange of gases.	5	1	2
	c.	Briefly write the composition of Blood.	5	2	1
	d.	What do you mean by Cardiac cycle? Detail it.	5	4	2
	e.	Draw a flow chart for coagulation process.	5	2	2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Write the mechanism of digestion of nutrient molecules in different parts of digestive system.	10	1	2
	b.	Explain the mechanism of transport of oxygen from lungs to the tissues.	10	1	2
	c.	Write various characteristics of the following cell: i. Red Blood Cell ii. White Blood Cell	10	2	2
	d.	Explain Briefly following points: i. Working of Heart ii. Electrical conduction in Heart	10	4	2

***** All the Best*****

Roll No.:		Course Code: SOS-B-BT202			
OP JINDAL UNIVERSITY					
Mid Semester Examination, May-2023					
B.Sc.(H)2 nd Semester [SOS-B-BT202]					
Biotechnology					
Plant Physiology					
Time: 2 Hrs.		Max. Marks: 50			
		M	CO	KL	
Section A (10 marks)					
All Questions are compulsory [05 x 02 marks=10 marks]					
1	a.	How many types of water could be there in the soil and which one is taken up by the root hairs?	2	2	2
	b.	Describe different types of transpiration.	2	2	2
	c.	Describe Primary structure of a Dicot Stem.	2	1	2
	d.	What are Casperian Stripes? What is their importance in plant water uptake?	2	2	2
	e.	Describe different deficiency Symptoms of Essential Elements in plants.	2	2	2
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	Define Imbibition, Diffusion, Osmosis and Plasmolysis with their significance.	4	2	2
	b.	Differentiate between Transpiration and Guttation.	4	2	2
	c.	Differentiate between Dorsiventral and Isobilateral leaves.	4	1	2
	d.	Describe different factors affecting transpiration.	4	2	2
	e.	How food is translocated in Plants? Describe in brief.	4	2	2
Section C (24 marks)					
Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	What do you understand by Meristem? Describe different types of Meristems.	8	1	2
	b.	What is understood by simple and complex permanent tissues? What are their main functions describe in brief.	8	1	2
	c.	What is understood by Micro and Macro Nutrients in Plants? Describe their different function in brief.	8	2	2
	d.	What is the process and importance of Secondary growth in Plants?	8	1	2
	e.	Why water is important to the Plant life? How it is taken upwards from roots describe in brief.	8	2	2

Course Code: SOS-B-BT-203

O P JINDAL UNIVERSITY

Mid Semester Examination, April-2023

B.Sc. Biotechnology. 2nd Semester

Entrepreneurship Development



Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [05 x 04 marks=20 marks]

1	a.	What is "Entrepreneur and "Entrepreneurship" ?	CO-1	KL-1
	b.	An entrepreneur must be open-minded and bearing leadership quality?	CO-1	CO-1
	c.	State two Importance of Entrepreneurship ?	CO-2	KL-2
	d.	Explain the role of creativity in Biotech-Entrepreneurship?	CO-1	CO-1
	e.	What is Project Management ?	CO-1	CO-1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Discuss the characteristics of an Entrepreneur?	CO-1	KL-1
	b.	Explain the role of creativity in Biotech-Entrepreneurship?	CO-1	KL-1
	c.	What are the multidimensional contributions of Bio-entrepreneurship to the society?	CO-2	KL-2
	d.	How Society and Entrepreneurship are inter-related to each other?	CO-2	KL-2

Roll No:		Course Code: SOS-B-CS202			
OP JINDAL UNIVERSITY					
Mid Semester Examination, May-2023					
B.Sc. 2 nd Semester					
Offered to Phy, Chem and Maths Hons.					
Introduction to Data structure					
Time: 2 Hrs.		Max. Marks: 50			
		M	CO	KL	
Section A (20 marks)					
Answer any 4 questions [04 x 05 marks=20 marks]					
1.	a.	What is Data structure? Write a brief note on classification of data structure.	5	CO1	1
	b.	What is a structure in C++? How to create a structure explain with example?	5	CO1	1
	c.	What is searching technique, Explain linear search.	5	CO4	1
	d.	What is an Array, Explain Types of Array?	5	CO1	1
	e.	Write C++ program to find the location of 7 from {4,7,3,2,1,7,9,0} using Binary search technique.	5	CO3	1
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2.	a.	What is Sorting? Explain any two shorting technique with example.	10	CO4	1
	b.	What is linked list? How it is represented in memory? Briefly explain types of linked list.	10	CO3	1
	c.	Define Stack. What are the operations of the stack? Write a program to push an element into a stack.	10	CO1	2
	d.	Write a program to insert and delete an element from an array. Explain your algorithm by suitable example.	10	CO1	2

