Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Chemistry

Program: BSc IInd

Physical Chemistry (CH-302)

SCHEME

Course Name	**Physical Chemistry**	**Course Type**	**Theory**
Course Code	**CH-302**	**Class**	BSc III Sem.
Instruction Delivery	**Per week Lectures: 2, Tutorial:, Theory: 2, Practical: - Total No. Classes Per Sem: 32(L), Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr Manish Kumar	**Course Instructors**	Theory: Dr Manish Kumar Practical: -- Dr Manish Kumar

COURSE OVERVIEW

Thermodynamics is a branch of physics that deals with heat, work, and temperature, and their relation to energy, entropy, and the physical properties of matter and radiation. The behavior of these quantities is governed by the four laws of thermodynamics which convey a quantitative description using measurable macroscopic physical quantities, but may be explained in terms of microscopic constituents by statistical mechanics. Thermodynamics applies to a wide variety of topics in science and engineering, especially physical chemistry, biochemistry, chemical engineering and mechanical engineering, but also in other complex fields such as meteorology.

PREREQUISITE

Thermodynamics, Distribution law, Chemical equilibrium and Extensive and Intensive properties

COURSE OBJECTIVE

The objective of this course is to study the Basic terms used and Ist law of thermodynamics which give idea about conversion of different forms of energy. It reflects about the internal energy and conversion of heat and work which helps to understand the conversion of different forms of energy. It also helps in study calculation of different terms in isothermal and adiabatic processes.

This Course helps in understanding the formation of different reversible reaction and chemical equilibrium constant, It also helps to understand solubility of different substances in polar and non-polar solvents.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Remember the type of system and various thermodynamical properties.

2	Remember the work, heat, heat capacity, enthalpy C_p, C_v and work and heat of different thermodynamical process.
3	Understand the equilibrium constant in terms of pressure, conc. And activity.
4	Understand the distribution of solute in polar and non-polar solvents.

COURSE CONTENT

Content
Thermodynamics-I Definition of thermodynamic terms: system,surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law – Joule – Thomson coefficient for ideal gass and real gas: and inversion temperature. **Thermodynamics-II** Calculation of w.q. dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reve rsible process, Temperature dependence of enthalpy, Kirchoffs equation. Bond energies and applications of bond energies. **Chemical Equilibrium** Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van't Hoff reaction isotherm. Le-Chatetier's principle and its applica tions Clapeyron equation and Clausius – Clapeyron equation its applications. **Distributioln Law** Nernst distribution law – its thermodynamic derivation, Modification of distribution law when solute undergoes dissociation, association and chemical combination. Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride. (ii) Determination of equilibrium constant of potassium tri-iodide complex and process of extraction.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	system,surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials	Practice Questions on different thermodynamic properties and processes.	1
2	Thermodynamic process. Concept of heat and work. Zeroth Law of thermodynamics		
3	First law of thermodynamics: statement, definition of internal energy and enthalpy.		
4	Heat capacity, heat capacities at constant volume and pressure and their relationship	Practice Questions on Joules law and Inversion temperature.	
5	Joule's law – Joule – Thomson coefficient for ideal gass and real gas: and inversion temperature.		
6	Questions on Ist law of thermodynamics		1
7	Questions on Joules law	Practice Questions on work and heat.	
8	Questions on Work done in different process.		
9	Calculation of work, heat, internal energy and enthalphy.	Practice questions on work done of Isothermal and adiabatic process	2
10	Reversible isothermal process with different properties		
11	Adiabatic reversible process and irreversible process		
12	Temperature dependence of enthalphy		
13	Kirchoffs equation		
14	Bond energies and application		
15	Questions on isothermal reversible process		
16	Questions on Bond energy and applications	Practice questions on Equilibrium constant and free energy	3
17	Equilibrium constant and free energy,		
18	Thermodynamic derivation of law		

	of chemical equilibrium		
19	Temperature dependence of equilibrium constant		
20	Van't Hoff reaction isochore, Van't Hoff reaction isotherm	Practice questions on Le-chatliers principle	
21	Le-Chatetier's principle and its applications		
22	Clausius – Clapeyron equation its applications		
23	Questions on Equilibrium constant		
24	Questions on Le-Chatetier's principle		
25	Nernst distribution law and its derivation	Practice questions on Nernst distribution law	4

26	Modification of distribution law when solute undergoes dissociation, association and chemical combination	Practice questions on degree of hydrolysis Practice questions on solubility of compounds in different medium.	
27	Applications of distribution law		
28	Determination of degree of hydrolysis		
29	Determination of equilibrium constant of potassium tri-iodide complex		
30	process of extraction		
31	Question on Distribution law		
32	Question on Degree of hydrolysis		

Text Book

A text book of Physical Chemistry, Vol III by K.L.Kapoor,
A Text-Book Of Physical Chemistry Vol II by K.L.Kapoor
Essentials of Physical Chemistry by B.R. Bahl, B.S. Bahl, and G.D. Tuli

Reference Books

Principal of Physical Chemistry by Puri Sharma Pathania
Physical Chemistry 3rd edition by Thomas Engel and Philip Reid

Physical Chemistry 2nd edition by Atkins

Web/Links for e-content

- https://en.wikipedia.org/wiki/Thermodynamics#Introduction

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

- https://youtu.be/ITwqsPnSLZ0?si=iMIVowZ4sgjAsqrQ
- https://youtu.be/R-EgSYeZGQU?si=hnLjPj4hcSljT3p9

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	What is 1st law of thermodynamics?
2	What do you understand by extensive and Intensive properties?
3	Define State functions and path functions.
4	What is zeroth law of thermodynamics?
5	How do heat and work are related to each other?
6	Define internal energy change and its conventions?
7	Work and heat are path functions. Explain by taking examples of different processes.
8	What is joule's law and state inversion temperature.
9	What is work done and heat in an isothermal reversible expansion?
10	Calculate different thermodynamic properties in adiabatic reversible expansion.
11	Discuss the Kirchoff's law and equation.
12	Define bond energies and how it is been calculated for a thermodynamic process.
13	Differenciate reversible and irreversible processes.
14	How does temperature effect the enthalpy of a reaction.
15	Discuss heat capacity
16	Prove that $C_p - C_v = R$.
17	Describe Equilibrium constant and calculate it in terms od pressure, conc. And activity.

18	What is chemical potential?
19	What is law of chemical equilibrium?
20	Explain Van't Hoff isotherm
21	Explain Van't Hoff isochore.
22	Derive expression of Clausius – Clapeyron equation
23	State applications of Clausius – Clapeyron equation
24	What is Le-Chatetier's principle?
25	What are the effect of the various factors on equilibrium constant?
26	State and explain Nernst distribution law
27	Derive an expression of Nernst distribution law
28	Derive an expression for solute undergoes association, dissociation and solvation.
29	Discuss Degree of hydrolysis and calculate hydrolysis constant.

30	Discuss effect of temperature on solubility.
31	Discuss degree of hydrolysis of aniline hydrochloride.
32	Determine equilibrium constant of potassium tri-iodide complex.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Chemistry

Program: B.Sc.(Non medical & Medical)

Inorganic Chemistry (CH-301)

SCHEME

Course Name	Inorganicl Chemistry	**Course Type**	**Theory**
Course Code	CH-301	**Class**	B.Sc 3rd sem
Instruction Delivery	**Per week Lectures: 2,Tutorial -1, Practical: -** **Total No. Classes Per Sem: 72(L), 28(T), -(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Mrs. Ritu	**Course Instructors**	Theory: Mrs. Ritu Practical: --

COURSE OVERVIEW

Inorganic chemistry is concerned with the quantum mechanics, spectroscopy & molecular structure.

PREREQUISITE

Basics of chemistry, Knowledge of inorganic chemistry terms, periodic table & coordination chemistry.

COURSE OBJECTIVE

The objective of this course is to explore the knowledge of d- block elements. This course will also provide us knowledge of co-ordination chemistry & non aqueous chemistry.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Remember the basic concept of d- block elements.
2	Understand the 1st,2nd & 3rd transition series.
3	Apply the various concepts of co-ordination compounds.
4	Analyze the application of Non-aqueous solvents.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

COURSE

CONTENT

Content
Definition of transition elements, position in the periodic table, Generall characteristic and properties of d- block elements, structure and properties of some compounds of transition elements - Tio2, VoCl2, FeCl3, CuCl2 & NiCo4.Comparison of properties of 3d- elements with 4d and 5d elements with reference only to ionic radii, Oxidation State ,magnetic and Spectre properties and stereochemistry. coordination compounds- Werner's theory of coordination compounds, effective atomic number, Chelates, Nomenclature of coordination compounds, isomerism in coordination compound, valence bond theory of transition metal complexes. Non Aqueous solvents- physical properties of solvent ,types of solvent and their general characteristics ,reactions in non aqueous solvent with reference to liquid Ammonia and liquid sulphur dioxide.

LESSON PLAN (THEORY AND TUTORIAL CLASSES

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Definition of transition elements position in the periodic table		1
2	Electronic configuration of 3d,4d and 5D series.		
3	General characteristics and properties of 3d series elements		
4	Structure and properties of Tio2, VoCl2		
5	Structure and properties of FeCl3, CuCl2 and NiCo4		

6	Comparison of properties of 3D element with 4d and 5d element with reference to ionic radii ,Oxidation State.	Discussion of previous year questions	
7	Magnetic and spectral properties and stereochemistry.		2
8	Revision of 3d -series		
9	Revision of 4d and 5d series		3
10	Coordination compounds,Werner's theory of coordination compound		
11	Effective atomic number and chelates		
12	Nomenclature of coordination		
13	Isomerism in coordination compounds		
14	Valance bond theory of transition metal complexes		
15	Revision of coordination compound		
16	Non aqueous solvent physical properties of solvent		
17	Types of solvent	Practice of VBT	4

18	General characteristics of solvent		
19	Reactions in liquid ammonia		
20	Reactions in liquid ammonia		
21	Reactions in liquid SO2		
22	Reactions in liquid SO2	Discussion of previous year questions paper	
23	Revision of non aqueous solvent		
24	Revision of non aqueous solvent		
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Text Book

"Modern approach to Inorganic chemistry by Dr. S.P.Jauhar"

"Inorganic chemistry by Pardeep publication"

Reference Books

- " Advance in inorganic chemistry by S.K.Agarwal".
- "Inorganic chemistry by Dr.S.K.Bansal"

Web/Links for e-content

- https://youtu.be/IV4wQMI_EG4?si=gXlbITQYM6vyFXic

- https://youtu.be/VlpNYNhudko?si=6RTZHa0kXJYhOg2k
- https://youtu.be/C2RoCtcgM1o?si=5AMB3ooEVuUsgOPk

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	Describe the geometry of NiCo4.
2	Explain the properties of Tio2.
3	Discuss the anomalous high ionization energy of Copper and chromium.
4	Why 3d series complexes are mainly high spin while 4d and 5d transition series complexes are of low spin?
5	Discuss the variation of radii of atoms and ions of 2nd and 3rd transition series in comparison with first transition series.
6	Why d- block elements are called transition elements?
7	What are basic postulates of Werner's coordination theory?
8	What are non aqueous solvent? Discuss their classification.
9	Discuss the important advantages of liquid sulphur dioxide as solvent in spite of its toxic nature.
10	Discuss the advantage of liquid ammonia.
11	Draw the structure of VoCl2.
12	

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Course Plan

Department of Chemistry

Program: B.Sc.(Non medical & Medical)

Organic Chemistry (CH-303)

SCHEME

Course Name	Organic Chemistry	**Course Type**	**Theory**
Course Code	CH-303	**Class**	B.Sc 3rd sem
Instruction Delivery	**Per week Lectures: 2,Tutorial -1, Practical: -** **Total No. Classes Per Sem: 72(L), 28(T), -(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Mrs. Ritu	**Course Instructors**	Theory: Mrs. Ritu Practical: --

COURSE OVERVIEW

Organic chemistry is concerned with the application of UV Spectroscopy & Alcohols, phenols & acids.

PREREQUISITE

Basics of chemistry, Knowledge of organic chemistry terms, knowledge of alcohols, phenols & acids.

COURSE OBJECTIVE

The objective of this course is to explore the knowledge of Alcohols, phemols & Carboxylic acids. This course will also provide us knowledge of UV spectroscopy .

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Remember the basic of alcohols & epoxides.
2	Understand the concept of Phenols.
3	Apply the various concepts of UV spectroscopy.
4	Analyze the application of Carboxylic acid & acid derivatives.

COURSE

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

CONTENT

Content
Alcohols -monohydric alcohol nomenclature ,methods of formation by reduction of aldehydes, ketones ,carboxylic acid and esters. Hydrogen bonding, acidic nature ,reactions of alcohols, Dihybric alcohols-nomenclature ,method of formation ,chemical reactions of vicinal glycols, oxidative clevage ,Pinacol-pinacolone rrangemeant.Synthesis of epoxides, Acid & base catalyzed ring opening of epoxides ,orientation of epoxide ring opening, reactions of Grignard and Organolithium reagents with epoxides, Phenols -nomenclature ,structure and bonding, preparation of phenols ,physical properties and acidic character, comparative acidic strength of alcohols and phenols, resonance, stabilization of phenoxide Ion, Reaction of phenols -electrophilic aromatic substitution ,mechanism of Fries rearrangement, Claisen rearrangement ,Reimer-Tiemann reaction , Kolbes reaction, and Schotten Baumann reactions, Ultraviolet absorption spectroscopy -Absorption laws (Beer- Lambert law),molar absortivity, presentation and analysis of UV spectra, type of electronic transitions ,effect of conjugation, concept of chromophore and auxoochrome, Bathochromic ,hypsochromic & hypochromic shifts. UV spectra of conjugated enes & enones. Woodward fiser rule, calculation of Max. wavelength of simple conjugated dienes & Alpha ,Beta -unsaturated ketone, application of UV Spectroscopy in structure elucidation of simple organic compounds,Carboxylic acids and acid derivatives -nomenclature of carboxylic acid, structure and bonding ,physical properties of carboxylic acid, acidity of carboxylic acid ,prepartions of Carboxylic acid, Reactions of Carboxylic acid, HVZ reaction, reduction of Carboxylic acid ,mechanism of decarboxylation, structure ,nomenclature and preparation of acid Chloride , esters,amides & acid anhydrides, relative stability of acyl derivatives, physical properties ,inter conversion of acid derivative by nucleophilic acyl substitution ,mechanism of esterisification and hydrolysis (acidic and basic).

LESSON PLAN (THEORY AND TUTORIAL CLASSES

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Alcohol -monohydric alcohol, nomenclature		1
2	Method of formation by reduction of aldehyde and ketone		
3	Reduction of carboxylic acid and Ester ,hydrogen bonding, acidic nature		
4	Reactions of alcohols ,dihydric alcohol- nomenclature		
5	Methods of formation, chemical reactions of vicional glycols		

6	Oxidative cleavage and pinacol -Pinacolone rearrangement ,synthesis of epoxide	Discussion of previous year questions	
7	Acid and base catalyzed ring opening of epoxide ,orientation of epoxide ring opening		
8	Reactions of Grignard and organo- Lithium reagents with epoxide		
9	Phenols- nomenclature ,structure and bonding		2
10	Preparation of phenols,physical properties and acidic character.		
11	Comparative acidic strength of alcohol and phenols,resonance stabilization of phenoxide ion		
12	Electrophilic aromatic substitution, Fries rearrangement and Claisen rearrangement		
13	Reimer- Tieman reaction, Kolbes reaction and schotten - Baumann reaction		
14	Ultraviolet absorption spectroscopy introduction		
15	Beer-Lambert law,molar absorptivity		
16	Presentation and analysis of UV spectra, types of electronic transition		

17	Effect of conjugation, concept of chromophore, auxochrome, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts.	Practice of numericals based on UV spectra	3
18	UV spectra of conjugated enes and enones.		
19	Woodward -Fieser rules,calculation of maximum wavelength of simple conjugated dienes and Alpha Beta-unsaturated ketones.		
20	Application of UV spectroscopy		
21	Carboxylic acid -nomenclature, structure and bonding ,physical properties		

22	Acidity of carboxylic acid, effect of substituent on acid strength, preparation of carboxylic acid	Discussion of previous year questions paper	4	
23	Reactions of carboxylic acid, HVZ reaction , reduction of carboxylic acid ,mechanism of decarboxylation			
24	Structure ,nomenclature and preparation of acid chloride, Ester			
	Amides and acid anhydride, relative stability of acyl derivative			
	Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution			
	Mechanism of esterification and hydrolysis (acidic and basic)			

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Text Book

"Modern approach to Organic chemistry by Dr. J. M. Sehgal"

"Organic Chemistry by S. L Vashishta"

Reference Books

- " Advance Organic chemistry by S. Chand".
- "Advance Organic Chemistry by Jagdamba Singh".

Web/Links for e-content

- https://youtu.be/J4vEsZLZnyA?si=NlU3cMp2vadRMrjN
- https://youtu.be/cNGPBZk3Qxw?si=PtDJPVEhMOe6ZQ2O
- https://youtu.be/nmvyZF0RyRg?si=3lNK-Y7H_W6wL-UN

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	Explain with mechanism dehydration of alcohol with concentrated sulphuric acid.
2	Explain with mechanism pinacol- pinocolone rearrangement.
3	Why phenols are more acidic than alcohols?
4	Describe fries rearrangement.
5	Explain the relative acidic strength of Ortho, meta and para nitrophenol.

6	Differentiate Chromophone and Auxochrome.
7	Define Beer lambert's law and molar absorptivity.
8	What is the difference between red shift and blue shift?
9	Describe the important applications of UV spectroscopy.
10	Why amides are least reactive of all acid derivative towards nucleophilic acyl substitution reaction?
11	Explain the relative acidic strength of formic acid, benzoic acid and acetic acid.
12	Explain the mechanism of hydrolysis of Ester in acidic and basic medium.

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Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Physics

Program: B.Sc. (Non- Medical)

(PHY -302)

SCHEME

Course Name	Optics I	**Course Type**	**Theory**
Course Code	PHY-302	**Class**	B.Sc.-II YEAR (III SEM)
Instruction Delivery	**Per week Lectures: 2, Tutorial:1, Practical: -** **Total No. Classes Per Sem: 60(L), 15(T), -(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr. Savita Devi	**Course Instructors**	Theory: Ms. Jyoti Practical: -Dr. Savita Devi

COURSE OVERVIEW

Optics is the branch of physics which is concerned with light and its behaviour pattern and properties.

PREREQUISITE

A basic understanding of waves and their properties like wavelength ,frequency and amplitude.

COURSE OBJECTIVE

To make students familiar with both historically important optical; experiments and modern optical instruments and methods.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	**Students will learn about the properties of light, such as reflection,refraction and diffraction.**
2	**Student will learn about the resolving power of different optical instruments and how holography works.**
3	**Student will able to learn about optical fibres and their application in communication.**
4	**Student will learn to apply and identify formulas related to optics.**

Sh. L. N. Hindu College, Rohtak (Haryana)
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COURSE

CONTENT

Content
Speed of Transverse waves on a uniform string ,Speed of longitudinal waves in a fluid superposition of waves(physical idea),Fourier Analysis of complex waves and its application for the solution of triangular and rectangular waves ,Half and Full wave rectifier outputs.Fourier transforms and its properties,application of Fourier transform to following functions: (i) $f(x)=e^{-x}$ (ii) $f(x)=1$ $[x] < a$ $=0$ $[x] > a$ Matrix method in par-axial optics ,Effects of translation and refraction,derivation of thin lens formulae ,unit plane,nodal planes ,system of thin lenses,Chromatic spherical coma,astigmatism and distortion aberrations and their remedies. Interference by Division of wave -front :Fresnel Bi-prism and its applications for determination of wavelength of sodium light and thickness of mica sheet, Lioyd's mirror , Phase change on reflection

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Speed of transverse waves on a uniform string	Explanation ,Theory ,derivation	1
2	Speed of longitudinal wave in a fluid		
3	Fourier analysis of complex wave and its application for the solution of triangular and rectangular waves.		
4	Superposition of Waves	Derivation	
5	Full and Hall wave rectifier outputs .Fourier transforms and its properties		

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Course Plan

6	Fourier Transform and its properties,Application of Fourier Transform to following functions. (i) $f(x)=e^{-x}$ (ii) f(x) =1[x]<a 0[x]>a	Definition and Derivations	
7	Matrix method in par-axial optics,effects of translation and refraction ,derivation of thin lens and thick lens formulae,		
8	Unit plane ,nodal plane ,system of thin lenses ,chromatic spherical coma,astigmatism and distortion aberrations and their remedies.	Definition ,Diagram,Derivation	2
9	Revision	Practice on the questions of Geometrical optics	
10	Interference by Division of wave front: Fresnel Bi-prism and its applications for determination of wavelength of sodium light and thickness of mica sheet	Theory,Explanation , Derivation	3
11	Lioyd's mirror ,Phase change on reflection.		
12	Revision	Practise on the questions of Interference	

Text Book

Optics by Neeraj Dahiya

Optics by Anil kumar Singhal

Reference Books

''Optics" by Ajay Ghatak
"Optics" by Tata Mc Graw Hill

Sh. L. N. Hindu College, Rohtak (Haryana)
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Web/Links for e-content

- https://youtu.be/2YAEn7TQ-j8?si=rspdfHdvFnpcKQ2Z

https://youtu.be/cbh52-5HJjE?si=q8NZJQt-zFha-PqFhttps://youtu.be/cbh52-5HJjE?si=q8NZJQt-zFha-PqF

https://youtu.be/5AqzGmbQ9Ls?si=pSCRDmkUPc3ji3A2s

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	Apply Fourier Theorem to analyse the output of a full wave rectifier?
2	Find the Fourier transform of : f(x) ={1for |x|<a} {0 for [x]>a}
3.	Explain Fourier Sine and cosine transformation?
4	Explain four forms of Fourier Integral.
5	What are even and odd functions?
6	Define Drichlet conditions .
7	State the Principal of superposition of waves?
8	Write one application of Fourier Transform?
9	What is chromatic aberration? How an achromatic combination is obtained ? Explain.
10	What is spherical aberration in lenses? Discuss it removal by using two plano convex lens of the same material separated by a finite distance.
11	Derive an expression for the focal length of a thin lens by method of system of matrix?
12	Discuss the formation of fringes by Lloyd's mirror and explain why central fringe is black? Find the expression for fringe width.
13	Give Theory and discuss in detail how to determine wavelength using Biprism.

14	State and prove Stokes law?
15	Two coherent sources of intensity ratio 100:1 interfere. Deduce the ratio of intensity between Maxima and minima in the in the interference pattern.
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Course Plan

Department of Physics

Program: B.Sc. Non Medical

Session (2024-25)

Computer Programming & Thermodynamics (PHY 301)

SCHEME

Course Name	**Computer Programming & Thermodynamics**	**Course Type**	**Theory**
Course Code	**PHY 301**	**Class**	B.Sc. N.M. III Sem
Instruction Delivery	**Per week Lectures: 6, Theory: 02,Tutorial:0, Practical: 04** **Total No. Classes Per Sem: 72(L), 24(T), - 48(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr. Savita Devi	**Course Instructors**	Theory: Dr. Savita Devi Practical: -- Dr. Savita Devi

COURSE OVERVIEW

Computer is a very versatile general purpose electronic device which processes large amount of information at high speed and produces result in a required format. Now a days computers are being used in almost every field of life. Thermodynamics deals with the study of energy transformations like heat energy into various other forms of energy and the relationship among various physical properties of substances which are affected by these transformations

PREREQUISITE

Computer, heat, temperature

COURSE OBJECTIVE

Objective of computer programming is to understand the Computer organisation , algorithm development and fortran preliminaries. Objective of thermodynamics is to understand the concept of heat in motion.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Understand the formation of algorithm and flowcharts of a given program
2	Define and explain the Physics governing heat laws
3	Get an introduction to the discipline and role of computer programming and thermodynamics in modern society
4	Solve the problems based on programming and thermodynamics

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Course Plan

COURSE CONTENT

Content
Computer Programming: Computer organisation, binary representation, algorithm development , flowcharts and their interpretation FORTRAN preliminaries: Integer and floating point arithmetic expression, built in functions , executable and non executable statements, input and output statements, Formats, IF, DO and GO TO statements, dimension arrays , statement function and function subprogram. Thermodynamic I: Second law of thermodynamics, Carnot theorem, absolute scale of temperature, absolute zero , entropy, show that dQ/T= Q . T-S diagram, Nernst heat law, Joule's free expansion, Joule Thomson experiment, Joule Thomson effect, liquification of gases, air pollution due to internal combustion engine. Thermodynamic II: Derivation of Claucius Claperyron latent heat equation, phase diagram and triple point of a substance, development of Maxwell thermodynamical relations, application of Maxwell relations in the derivations of relations between entropy specific heats and thermodynamic variables Thermodynamic functions; Internal energy U, Helmholtz function F, enthalpy H, Gibbs function G and the relation between them.

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Computer organisation	Define, expression, explanation	1
2	Binary representation		
3	Algorithm development		
4	Flowcharts and their interpretations		
5	FORTRAN preliminaries		

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6	Integer and floating point arithmetic expression	Itroduction, derivation	1
7	Built in functions	Define, expression, explanation	
8	Executable and non executable statements		
9	Input and output statements		
10	Formats	State, expression, explanation	
11	IF DO and GO TO statements		
12	Dimension arrays statement function and functions of subprogram		
13	Revision	Discuss and Practice questions on programming	
14	Question on interference		
15	Thermodynamics	introduction	2
16	Second law of thermodynamics	Expression and explanation	
17	Carnot theorem		
18	Absolute scale of temperature	State,Expression and explanation	
19	Absolute zero		
20	Entropy		
21	dQ/T= Q	Explanation and derivation	
22	T- S diagram Nernst heat law	State, expression and explanation	
23	Joules free expansion		
24	Joules Thomson experiment	State, expression	
25	Joule Thomson effect		
26	Liquification of gases	Introduction	2
27	Air pollution due to internal combustion engine	State, expression and explanation and revision Practice the questions on Thermodynamics -I	
28	Revision		
29	Questions		
30	Thermodynamics II	Introduction	

31	Derivation of Claucius Claperyron latent heat of equation	State, expression and explanation	3
32	Face diagram and triple point of		

	a substance		
33	Development of Maxwell thermodynamical relations	IDerivation and explanation	
34	Application of Maxwell relations in the derivation of relations between entropy specific heat and thermodynamic variables	State, discussion	
35	Thermodynamic functions	State, expression and explanation	
36	Internal energy		
37	Helmhols functions	State, expression and explanation	
38	Enthalpy	State, expression and explanation 3	
39	Gibbs function	State, expression and explanation, Discussion	
40	Entropy change in reversible f process		
41	Entropy change in irreversible process, Principle of degradation of energy		
42	RevisionQuestion on polarization		
43	.	.	
44	.		

Text Book

Dr. M.S.Sheoran, Jaivir Singh, Amar Singh, Pradeep Ahlawat

Reference Books

Dr.S.D.Aghav, V.K.Dhas, Dr.P.S. Tambade, B.M.Laware, S.R.De Groot and P. Mazur

Web/Links for e-content

"ebookselibrary.com/institute/book-detail/higher-education/physics/COMPUTER-PROGRAMMING,-THERMODYNAMICS-1219#" https://www.ebookselibrary.com/institute/book-detail/higher-education/physics/COMPUTER-PROGRAMMING,-THERMODYNAMICS-1219#

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

Sr. No.	Problem
1	Write the preliminary to draw a flowchart
2	Give limitation of flowcharts
3	Explain formatted input output statements used in 4th run
4	State and explain the first and second law of thermodynamics discuss the significance of the second law
5	State and prove the carnot theorem
6	Discuss joule Thomson experiment
7	A gas atmospheric pressure is compressed adiabatically so that it's volume reduces to half of its original volume. Given that gamma= 1.4
8	Describe absolute scale of temperature . Why is it taken as a standard scale? What is the meaning of absolute zero on this scale?

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan (Odd Sem 2024-25)

Department of Mathematics

Program: BA / BSc

Partial Differential Equations

SCHEME

Course Name	**Partial Differential Equations**	**Course Type**	**Theory**
Course Code	12 BAM 232/ 12BSM 232	**Class**	BA / BSc III Sem.
Instruction Delivery	**Per week Lectures: 4, Tutorial:1** **Total No. Classes Per Sem: 44(L), 11(T)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr. Sunny Kapoor	**Course Instructor**	Theory: Dr. Sunny Kapoor

COURSE OVERVIEW

Partial Differential Equations is the branch of Mathematics which deals with an equation containing an unknown function of two or more variables and its partial derivative with respect to these variables. Partial differential equations are more important in calculus. It has fundamental importance in many areas of physics and engineering. It is widely used to model many systems in different fields such as Heat equation, Wave equation, Laplace equation, Astronomy, Cosmology, Quantum Mechanics, Fluid Dynamics, Electromagnetism, Artificial Intelligence, Language Model and Mathematical finance. It helps us to solve linesr partial differential equations of first and higher orders.

PREREQUISITE

Differentiation, Calculus, Algebra, Integration.

COURSE OBJECTIVE

The objective of this course is to develop a clear understanding of concepts of linear partial differential equations of first order, second order and higher order derivatives and computational solution methods for PDE. It helps the students to understand analogies between mathematical descriptions of different phenomenon in physics and engineering, classify PDE'S, apply analytical methods and physically interpret the solutions.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	This course will enable students to form partial differential equation by eliminating arbitrary constants.
2	Students will be able to apply a range of techniques to solve first & second order partial differential equations.
3	They will be able to classify the linear partial differential equations of second degree as

	hyperbolic, parabolic and ellipse types.
4	They will be able to reduce second order linear partial differential equations to canonical forms and find their solutions.
5	It will enable them to solve Cauchy problem for second order partial differential equations.
6	It will help them to model physical phenomena using partial differential equations such as the heat and wave equations.

COURSE CONTENT

Content
Section – I Partial differential equations: Formation, order and degree, Linear and Non-Linear Partial differential equations of the first order: Complete solution, singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method. Section – II Linear partial differential equations of second and higher orders, Linear and non-linear homogeneous and non-homogeneous equations with constant co-efficients, Partial differential equation with variable co-efficients reducible to equations with constant coefficients, their complimentary functions and particular Integrals, Equations reducible to linear equations with constant co-efficients. Section – III Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order. Section – IV Cauchy's problem for second order partial differential equations, Characteristic equations and characteristic curves of second order partial differential equation, Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions), Diffusion (Heat) equation (one and two dimension) in Cartesian Co-ordinate system.

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

S. No	Topic to be Delivered	Tutorial Plan	No. of Lectures Required	Unit
1	Formation of Partial Differential equation by elimination of arbitrary constants		2	1

2	Formation of Partial Differential equation by elimination of arbitrary functions	Practice questions on formation of PDE	2	
3	Solution of First order linear PDE		3	
4	First order Non- linear PDE- Compatibility & Solution	Practice questions on Solution of Lagrange's Linear Equation	1	
5	Charpit's Method		2	
6	Some standard forms & their solution	Practice Questions on Charpit's Method	2	
7	Solution by Jacobi's Method		2	
8	Solution of Homogeneous linear PDE with constant co-efficients	Practice questions on solution of Homogeneous Linear PDE	4	2
9	Solution of non Homogeneous linear PDE with constant coefficients	Practice questions on solution of Non-Homogeneous Linear PDE	3	
10	Partial Differential equations with variable co-efficients Reducible to equations with constant coefficients	Practice questions on solution of PDE with variable coefficients	2	
11	Classifications and canonical forms of second order linear PDE	Practice Questions on Canonical forms	5	3
12	Monge's method for PDE of second order	Practice Questions on Monge's Method	4	
13	Characteristic equations ad characteristic curves Cauchy's problem		2	4
14	Solution of one dimensional and two dimensional wave Equation	Practice Questions on Cauchy's Problem	4	
15	Solution of one dimensional and	Practice questions on solution of	3	

	two dimensional Heat Equation	Wave Equations		
16	Solution of one dimensional and two dimensional Laplace Equation	Practice questions on solution of Heat & Laplace Equations	3	

Text Book

Partial Differential Equations (New College), Jeevansons Publications.

Reference Books

- D.A. Murray : Introductory Course in Differential Equations. Orient Longaman (India) . 1967
- Erwin Kreyszing : Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999
- A.R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd
- Ian N.Sneddon : Elements of Partial Differential Equations, McGraw Hill Book Company, 1988
- Frank Ayres : Theory and Problems of Differential Equations, McGraw Hill Book Company, 1972
- J.N. Sharma & Kehar Singh : Partial Differential Equations

Web/Links for e-content

- https://youtu.be/N7qVGiOafls?si=kzd7Lj-9fklnMZwW
- https://youtu.be/L_ulJo71Tg0?si=O_wg35ixdlQ5oI8A
- https://youtu.be/vZEN4NXhmag?si=qmLQu-3GLFX-TbN2
- https://youtu.be/0UDOTj76BiE?si=tIAzc-i04pPxk2-a

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	Prove that the partial differential equation of the set of all cones having their vertex at the origin is $px + qy = z$.
2	Solve $y^2p + x^2q = x^2y^2z^2$.
3	Find the complete integral, general integral and the singular integral of $2(z + xp + yq) = yp^2$.
4	Solve the partial differential equation $q^2 = z^2(1 - p^2)p^2$.

5	Find the characteristic of: $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x\,\partial y} + y^2\frac{\partial^2 u}{\partial y^2} = 0.$
6	Solve :$(p^2 + q^2)y = qz$ using Charpit's method.
7	Find the complete integral of $p_3x_3(p_1 + p_1) + x_1 + x_2 = 0$ by using Jacobi's method.
8	Solve :$yzp + zxq = xy$.
9	Form the partial differential equation by eliminating arbitrary function from $z = f(\frac{xy}{z})$.
10	Solve :$(3D^2 - 2D'^2 - D - 1)z = 4e^{x+y}\cos(x + y)$.
11	Solve :$x^2\frac{\partial^2 z}{\partial x^2} - y^2\frac{\partial^2 z}{\partial y^2} = x^2y$.
12	Solve :$(D^2 - DD' - 2D)z = \sin(3x + 4y)$
13	Solve :$(D^2 - DD' - 2D'^2)z = (2x^2 + xy - y^2)\sin xy - \cos xy$.
14	Reduce the equation $x^2r - 2xys + y^2t - xp + 3yq - \frac{8y}{x} = 0$ to the canonical form and hence solve it.
15	Classify and reduce the equation $\frac{\partial^2 z}{\partial x^2} - x^2\frac{\partial^2 z}{\partial y^2} = 0$ to canonical form.
16	Classify and reduce the equation $\frac{\partial^2 z}{\partial x^2} - y^2\frac{\partial^2 z}{\partial y^2} = y$ to canonical form.
17	Solve the one dimensional diffusion equation $\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2}\frac{\partial u}{\partial t}$ in the region $0 \le x \le \pi, t \ge 0$ Subject to the conditions: (i) $u(0,t) = u(\pi,t) = 0$ for all t (ii) u is finite as $t \to \infty$ (iii) $u(x,0) = \begin{cases} x, & 0 \le x \le \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} \le x \le \pi \end{cases}$

18	Find the solutIon of $\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2}\frac{\partial u}{\partial t}, 0 < x < p, t > 0$ for which $u(0,t) = u(1,t) = 0$ and $u(x,0) = k \sin 2\pi x$. Solve the Cauchy problem, described by the equation $\frac{\partial^2 z}{\partial x^2} - \frac{1}{c^2}\frac{\partial^2 z}{\partial t^2} = 0, c > 0$ subject to condition $z(x,0) = f(x)$ and $\left[\frac{\partial z}{\partial y}\right]_{t=0} = g(x)$.

Sh. L. N. Hindu College, Rohtak (Haryana)CoursePlan

Department of Mathematics

Program: BA/B.sc Mathematics

Statics (12BAM233)

SCHEME

CourseName	**Statics**	**CourseType**	**Theory**
CourseCode	**12BAM233**	**Class**	**BA/Bsc -3rdsem**
Instruction Delivery	**Per week Lectures: 4** **Total No. Classes Per Sem:45(L),5(T)** **Assessment in Weightage: Sessional(20%),End Term Exams(80%)**		
Course Coordinator	**Ms. Sonam**	**Course Instructors**	**Theory:**Ms. Sonam

COURSE OVERVIEW

This covers these topics: forces ,parallel forces ,friction, null lines nad wrenches

PREREQUISITE

Basic knowledge of Science , Physics

COURSE OBJECTIVE

Learn how force, moment, and coupling affect rigid bodies, calculate forces in frames and trusses, and study friction between rigid bodies.

COURSE OUTCOMES(COs)

Afterthe completion of the course,the student willbe able to:

CONo.	CourseOutcomes
1	The Students will able to define Resultant, Component of a Force, Prove the Parallelogram of Forces, Triangle of Forces, Converse of the Triangle of forces, lami's theorem, Like and unlike parallel forces, Moment of a force and Couple with examples
2	This course will help the students to learn the analytical conditions of equilibrium of coplanar forces, discuss Friction, Forces of Friction, Cone of Friction, Angle of Friction and Laws of friction ,concept of centre of gravity
3	The students will acquire the knowledge of virtual work and learn the concept of forces in three dimensions
4	The students will understand the concept of wrenches ,null lines and planes ,stable and unstable equilibrium

Sh. L. N. Hindu College, Rohtak (Haryana)CoursePlan

COURSE CONTENT

Content
UNIT-I Composition and resolution of forces. Parallel forces. Moments and Couples. **UNIT-II** Analytical conditions of equilibrium of coplanar forces. Friction. Centre of Gravity. **UNIT-III** Virtual work. Forces in three dimensions. Poinsots central axis. **UNIT-IV** Wrenches. Null lines and planes. Stable and unstable equilibrium.

Sh. L. N. Hindu College, Rohtak (Haryana)CoursePlan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L.No	Topic to be Delivered	Tutorial Plan	Unit
1	Introduction to basics defintions related to mechanics :rigid body ,force, weight ,mass etc. Results and formulae for finding Resultant.		2
2	Introduction to friction, types of friction ,basics defintions		
3	Articles related to force of friction		
4	Articles related to force of friction		
5	Numericals related to force of friction	Problems discussion	
6	Problems on equilibrium of rods and ladders		2
7	Numericals on ladder and rod topic		
8	Centre of gravity defintions and formulaes		
9	Numericals		
10	Centre of gravity of a body by integration		
11	Numericals	Problems Discussion	3
12	Forces in three Dimensions:introduction to three dimensional geometry,parallelepiped:its vertices,edges ,diagonals		
13	Working rules for numerical: How to find components of forces ,moments, equation of central axis ,resultant ,system reduced to single force ,pitch etc.		
14	Numericals Continue…		
15	Numericals Continue…		
16	Theorems		4
17	Wrenches:basics and Theorems		
18	Theorems		

19	Numericals		
20	Null lines and null planes: basics and theorems		
21	Numericals	Problems Discussion	4
22	Numericals		
23	Stable ,unstable and neutral equilibrium		
24	Numericals		
25	Numericals		
26	Forces acting at a point:Basics formulae to find magnitude and direction of resultant and Numericals		**1**
27	Resolved parts numericals		
28	Triangle law of forces		
29	lami's theorem and converse of lami's theorem		1
30	Polygon law of forces and, ,Resultant of any number of concurrent and coplanar forces		
31	Introduction to like and unlike parallel forces	Problems Discussion	1
32	Analogue of Lami's theorem,centre of parallel forces		
33	Resolved part for parallel forces		
34	Numerical practice		
35	Moments:definitions,sign o moment of a force about a point		
36	Numericals		1
37	Numericals continue…		
38	Problems discusion		
39	Couples:definition, sign of moment of couple, equilibrium of two couples		
40	Numericals		

41	Numericals	Problems Discussion	**3**
42	Virtual Work:definition,numericals		
43	Theorems		
44	Numericals		
45	Numericals		

TextBook

Jeevansons Publications

Reference Books

1. S.L. Loney : Statics, Macmillan Company, London

2. R.S. Verma : A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad.

Web/Links for e-content

NOTES
https://drive.google.com/drive/folders/19sg8Fq3JZyOfh_CQzcX4cifZnvjzDVtW

MDU Question Papers
https://drive.google.com/file/d/11wOmi7t90Mp2XvQn87GLUYiz3APv5lQ3/view?usp=drivesdk

Sh. L. N. Hindu College, Rohtak (Haryana)CoursePlan

PRACTICE QUESTIONS (QUESTION BANK)

SNo	Problem
	ShortQuestions
1	Define wrench or screw.
2	State laws of limiting friction
3	If C is the middle point of AB then find the resultant of two forces OA and OB
4	State converse of lami's theorem
5	Define wrench and poinsot's central axis
6	Define coefficient of friction
7	Write m- n theorem
8	Find C.G. of a uniform triangular lamina.
9	Three equal forces acting at a point are in equilibrium.find the angle between them.
10	Define angle of friction
11	Find the thrust of an inextensible rod.
12	Define central axis in three dimensions and write its characteristics.
3	Find the centre of gravity of a lamina in the form of a triangle.
14	Write the condition when the system of forces in three dimension reduces to a single force.
15	State triangle law of forces
16	Write the condition when the system of forces in three dimension reduces to a single force.
17	Prove that the resultant of two forces OA and OB is a force 2 OC ,where C is the middle point of A B
18	Prove that the resultant of two forces OA and OB is a force 2 OC ,where C is the middle point of A B
19	Forces of 4,6,8,10 and 12 kg act qlong the sides AB,BC,CD,DA and diagonal AC of a Square ABCD . Find the sum of the moment of thr forces about B.
20	Define null lines, null plane and null point.
21	Define friction and force of friction
22	Define like and unlike forces
23	Write the conditions of equilibrium of a system of coplanar forces acting on a rigid body
24	If D and E are the middle points of the sides AB and AC of a triangle ABC , prove that the resultant of the forces represented by BE and DC is represented in magnitude and direction by 3/2 BC
25	Find a point O inside a quadrilateral ABCD such that if a particle placed at it be acted upon by forces represented by forces represented by OA ,OB ,OC ,OD ,it will be in equilibrium.

26	AB and AC are two strings 9 m. and 12 m. long attached to pegs B and C at a horizontal distance 15 m apart. Find the tensions in the strings when a weight of 10 kg is suspended from A.
27	A weight of 26 N is suspended by two light inelastic strings of length 5 m and 12 m from two points at the same level and 14 m apart . Find the tensions in thev strings.
28	Forces of 6, 8, 12 kg. wt. act along BC ,CA ,AB of the sides of a triangle of lengths 3,4,5 cm respectively . Show that their resultant is a force of 2 kg. Wt. acting parallel to AB.
29	ABCDEF is a regular hexagon.Find the direction and magnitude of resultant of force equal to 7,18,5,9 and 19 kg wt. acting at A respectively along AB ,CA,AD,AE,AF.
30	A heavy uniform rod 4m long rest horizontally on two pegs which are 1 m apart . A Weight of 10 kg suspended from one end or a weight of 4 kg suspended from the other end will jusy tilt the rod up. Find the weight of the rod and the distancesof the pegs from the centre of the rod.
31	To find the greatest inclination of a rough plane on which a heavy particle can rest inlimiting equilibrium without the application of any other force
32	To find the limits between which a force must lie in order to keep a body in equilibrium on a rough inclined plane ,when the force acts horizontally.
33	A heavy body is placed on a rough inclined plane. To find the force just sufficient to move the body up the plane , the force acting in a vertical plane through the line of greatest slope through the body.
34	The centre of gravity of a uniform parallelogram lamina.
35	Find the centroid(C.G.) of a plane lamina in form of a quadrant of an ellipse when matter is distributed uniformly.
36	Any system of forces acting on a rigid body can be reduced in general to a force acting at an arbitrary chosen point of the body and a couple**.**
37	Show that among null lines of any system of forces ,four generators of any hyperboloid ,two belonging to one system of generators and two to the other.
38	Find the null point of the plane x+y+z=0 for the system X,Y,Z;L,M,N.
39	The axes of two given wrenches intersect at right angles their intensities are X and Y and their pitches are px and py . If the pitched are given , find the locus of the central axis.
40	Show that every given system of forced acting on a rigid body can be reduced to a wrench.
41	Prove that any wrench may be resolved into two wrenched, whose axes intersect at right angles ,on an infinite number of ways.
42	Three forces P,Q and R act along three non intersecting edges of a cube , find the central axis.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Physics

Program: B.Sc. Non Medical

Session (2024-25)

Computer Programming & Thermodynamics (PHY 301)

SCHEME

Course Name	**Computer Programming & Thermodynamics**	**Course Type**	**Theory**
Course Code	**PHY 301**	**Class**	B.Sc. N.M. III Sem
Instruction Delivery	**Per week Lectures: 6, Theory: 02,Tutorial:0, Practical: 04** **Total No. Classes Per Sem: 72(L), 24(T), - 48(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr. Savita Devi	**Course Instructors**	Theory: Dr. Savita Devi Practical: -- Dr. Savita Devi

COURSE OVERVIEW

Computer is a very versatile general purpose electronic device which processes large amount of information at high speed and produces result in a required format. Now a days computers are being used in almost every field of life. Thermodynamics deals with the study of energy transformations like heat energy into various other forms of energy and the relationship among various physical properties of substances which are affected by these transformations

PREREQUISITE

Computer, heat, temperature

COURSE OBJECTIVE

Objective of computer programming is to understand the Computer organisation , algorithm development and fortran preliminaries. Objective of thermodynamics is to understand the concept of heat in motion.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Understand the formation of algorithm and flowcharts of a given program
2	Define and explain the Physics governing heat laws
3	Get an introduction to the discipline and role of computer programming and thermodynamics in modern society
4	Solve the problems based on programming and thermodynamics

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

COURSE CONTENT

Content
Computer Programming: Computer organisation, binary representation, algorithm development , flowcharts and their interpretation FORTRAN preliminaries: Integer and floating point arithmetic expression, built in functions , executable and non executable statements, input and output statements, Formats, IF, DO and GO TO statements, dimension arrays , statement function and function subprogram. Thermodynamic I: Second law of thermodynamics, Carnot theorem, absolute scale of temperature, absolute zero , entropy, show that dQ/T= Q . T-S diagram, Nernst heat law, Joule's free expansion, Joule Thomson experiment, Joule Thomson effect, liquification of gases, air pollution due to internal combustion engine. Thermodynamic II: Derivation of Claucius Claperyron latent heat equation, phase diagram and triple point of a substance, development of Maxwell thermodynamical relations, application of Maxwell relations in the derivations of relations between entropy specific heats and thermodynamic variables Thermodynamic functions; Internal energy U, Helmholtz function F, enthalpy H, Gibbs function G and the relation between them.

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Computer organisation	Define, expression, explanation	1
2	Binary representation		
3	Algorithm development		
4	Flowcharts and their interpretations		
5	FORTRAN preliminaries		

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

6	Integer and floating point arithmetic expression	Itroduction, derivation	1
7	Built in functions	Define, expression, explanation	
8	Executable and non executable statements		
9	Input and output statements		
10	Formats	State, expression, explanation	
11	IF DO and GO TO statements		
12	Dimension arrays statement function and functions of subprogram		
13	Revision	Discuss and Practice questions on programming	
14	Question on interference		
15	Thermodynamics	introduction	2
16	Second law of thermodynamics	Expression and explanation	
17	Carnot theorem		
18	Absolute scale of temperature	State,Expression and explanation	
19	Absolute zero		
20	Entropy		
21	dQ/T= Q	Explanation and derivation	
22	T- S diagram Nernst heat law	State, expression and explanation	
23	Joules free expansion		
24	Joules Thomson experiment	State, expression	
25	Joule Thomson effect		
26	Liquification of gases	Introduction	2
27	Air pollution due to internal combustion engine	State, expression and explanation and revision Practice the questions on Thermodynamics -I	
28	Revision		
29	Questions		
30	Thermodynamics II	Introduction	

31	Derivation of Claucius Claperyron latent heat of equation	State, expression and explanation	3
32	Face diagram and triple point of		

	a substance		
33	Development of Maxwell thermodynamical relations	IDerivation and explanation	
34	Application of Maxwell relations in the derivation of relations between entropy specific heat and thermodynamic variables	State, discussion	
35	Thermodynamic functions	State, expression and explanation	
36	Internal energy		
37	Helmhols functions	State, expression and explanation	
38	Enthalpy	State, expression and explanation 3	
39	Gibbs function	State, expression and explanation, Discussion	
40	Entropy change in reversible f process		
41	Entropy change in irreversible process, Principle of degradation of energy		
42	RevisionQuestion on polarization		
43	.	.	
44	.		

Text Book

Dr. M.S.Sheoran, Jaivir Singh, Amar Singh, Pradeep Ahlawat

Reference Books

Dr.S.D.Aghav, V.K.Dhas, Dr.P.S. Tambade, B.M.Laware, S.R.De Groot and P. Mazur

Web/Links for e-content

"ebookselibrary.com/institute/book-detail/higher-education/physics/COMPUTER-PROGRAMMING,-THERMODYNAMICS-1219#" https://www.ebookselibrary.com/institute/book-detail/higher-education/physics/COMPUTER-PROGRAMMING,-THERMODYNAMICS-1219#

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

Sr. No.	Problem
1	Write the preliminary to draw a flowchart
2	Give limitation of flowcharts
3	Explain formatted input output statements used in 4th run
4	State and explain the first and second law of thermodynamics discuss the significance of the second law
5	State and prove the carnot theorem
6	Discuss joule Thomson experiment
7	A gas atmospheric pressure is compressed adiabatically so that it's volume reduces to half of its original volume. Given that gamma= 1.4
8	Describe absolute scale of temperature . Why is it taken as a standard scale? What is the meaning of absolute zero on this scale?

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Hindi

Program: Bsc.

□□□□□ (compulsory)

SCHEME

Course Name	□□□□□	**Course Type**	**Theory**
Course Code		**Class**	Bsc.3rd. sem.
Instruction Delivery	**Per week Lectures: 5, Tutorial:1, Practical: -** **Total No. Classes Per Sem: 20(L), 15(T)** **Assessment in Weightage: Sessional (10%), End Term Exams (40%)**		
Course Coordinator	Mrs. Kiran Devi	**Course Instructors**	Mrs. Kiran Devi

COURSE OVERVIEW

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PREREQUISITE

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COURSE OBJECTIVE

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COURSE OUTCOMES (COs)

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COURSE CONTENT

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LESSON PLAN (THEORY AND TUTORIAL CLASSES)

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Web/Links foe-content

1. https://www.sankritiias.com
2 .https://www.parentsassembly.com.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

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