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B.P.S. INSTITUTE OF HIGHER LEARNING KHANPUR KALAN

B.P.S. MAHILA VISHWAVIDYALAYA KHANPUR KALAN (SONEPAT)

Minutes of the Meeting of Undergraduate Board of Studies in Physics & M.Sc.Physics

A meeting of BOS in Physics was held in the office of Principal, BPSIHL, on August 12, 2017 at 11.00 a.m. to discuss and approve the following agenda items.

i. The Scheme and Syllabi for M.Sc. Physics (1st Semester) w.e.f. 2017-18
ii. The Scheme and Syllabi for B.Sc. Non-Medical& Computer Science (1st to 6th Semesters and B.Sc.Home Science (~~1st~~ 2nd Semester) w.e.f. 2017-18

The following members were present in the meeting:

1. Dr. Veena, Dean , Faculty of Sciences, BPSMV (Chairperson)
2. Dr. Ashwani Sharma, Prof., MDU External Member
3. Dr. M.S.Yadav, Prof., KUK External Member
4. Mrs.Sushma Joshi, Associate Prof. in Physics Member
5. Ms.Renu Jakhar, Asst.Prof., Arya Adrash Girls College, Madlauda, Panipat (Special Invitee)
6. Mr.Mukesh Chander, Asstt.Prof., Arya Adrash Girls College, Madlauda, Panipat (Special Invitee)
7. Dr.Lalita Taneja, Asstt.Prof., Hindu Girls College, Sonipat (Special Invitee)
8. Ms.Sunita Arora, Asstt.Prof., GVM Girls College, Sonipat (Special Invitee)
9. Dr.O.P.Garg, Asstt.Prof., GVM Girls College, Sonipat (Special Invitee)

The Board unanimously approved the scheme and syllabi for undergraduate courses (B.Sc. Non-Medical & Computer Science (1st to 6th Semesters for Physics subject), B.Sc. Home Science (~~1st~~ 2nd semesters) and M.Sc. Physics (1st Semester) w.e.f. 2017-18 with minor changes.

The meeting ended with the thanks to the chair.

12/8/17

Dr. Veena | Dr. Ashwani Sharma | Dr. M.S.Yadav | Mrs.Sushma Joshi

Ms.Renu Jakhar | Mr.Mukesh Chander | Dr.~~Lalita~~ Taneja | Ms.Sunita Arora | Dr.O.P.Garg

Latesh | Sunita Arora

Ms. Indu Dahiya

13/8/17

11 (13-24)

*Academic Council held in 14-09-2017 for implementation from the Academic session 2017-18.

BHAGAT PHOOL SINGH MAHILA VISHWAVIDYALAYA,
KHANPUR KALAN(SONEPAT)
(State University established under legislature act xxxi of 2006)

Course Curriculum & Scheme of Examination
For Physics
B. Sc. I (Non Medical + Computer Science)
2017-18

S. No.	Paper Code	Course Title	Teaching Schedule L	T	P	Internal Assessment	External Assessment	Credit (Hrs)	Total Marks
Paper-I	PHY-101-A	Classical Mechanics and Theory of Relativity	3	0	0	10	40	3	50
Paper-II	PHY-101-B	Electricity, Magnetism and Electromagnetic Theory	3	0	0	10	40	3	50
Paper-III	PHP-101	Practical	0	0	4	10	40	2	50
Total Credits /marks			6	0	4	30	120	8	150

2nd Semester

S. No.	Paper Code	Course Title	Teaching Schedule L	T	P	Internal Assessment	External Assessment	Credit (Hrs)	Total Marks
Paper-I	PHY-102-A	Properties of Matter and Kinetic Theory of gases	3	0	0	10	40	3	50
Paper-II	PHY-102-B	Semiconductor Devices	3	0	0	10	40	3	50
Paper-III	PHP-102	Practical	0	0	4	10	40	2	50
Total Credits /marks			6	0	4	30	120	8	150

Note:

- **Practical examination will be held at the end of each semester**
- **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.**
- **One Day scientific tour is compulsory.**

*Approved by 19th Academic Council held in 14-09-2017 for implementation from the Academic session 2017-18.

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D-18

B. Sc. I (Non -Medical /Computer Science)
Semester-I
Subject: Physics
Paper-I
CLASSICAL MECHANICS AND THEORY OF RELATIVITY

Course Code: PHY-101-A
3-0-0
Internal Marks: 10 (8+2)
(Sessional /project +Attendance)

Total Credits: 3 L-T-P
Total Marks: 50 External Marks: 40

Unit 1: Basic concepts of Classical mechanics:
Mechanics of single and system of particles, Conservation law of linear momentum, Angular momentum and mechanical energy for a particle and a system of particles Centre of Mass and equation of motion, Constrained Motion

Unit 2: Generalized Notations:
Degrees of freedom and Generalized coordinates, Transformation equations, Generalized Displacement, Velocity, Acceleration, Momentum, Force , and Potential, Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Linear Harmonic oscillator, Simple pendulum, Atwood's machine.

Unit 3: Theory of relativity:
Reference system, Inertial and Non-inertial frames, Galilean invariance and Conservation laws, Newtonian Relativity Principle, Michelson-Morley experiment: search for ether, Lorentz transformations.

Unit 4: Applications of theory of relativity:
Length Contraction, Time Dilation, Twin Paradox, Velocity addition theorem, Variation of mass with velocity, Mass energy equivalence.

Textbooks and references:

1. Classical Mechanics by H. Goldstien.
2. Berkely Physics Course by E. M. Purcell vol. I.
3. Sond by Brijlal and Subramanium
4. Classical Mechanics by Landanlifshiz
5. Concepts of Modern Physics by Arthur Beiser

Note::
1. **Nine Questions will be set in total.**
2. **Question number One will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.**
4. **All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.**
6. **20% numerical problems are to be set.**
7. **Use of scientific (non-programmable) calculator is allowed.**

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D-18

B. Sc. I(Non-Medical / Computer Science)
Semester-I
Subject: Physics
Paper-II
ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

Course Code: PHY-101-B
3-0-0
Internal Marks: 10
(Sessional + Attendance)

Total Credits: 3 L-T-P
Total Marks 50 External Marks: 40

Unit 1: Vector background and Electric field:
Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of a vector and their physical significance, Flux of a vector field, Divergence and curl of a vector and their physical significance, Gauss's divergence theorem, Stoke's theorem, Derivation of electric field E from potential as gradient, Derivation of Laplace and Poisson equations, Electric flux, Gauss's Law, Mechanical force of charged surface, Energy per unit volume

Unit 2: Magnetism:
Magnetic induction, Magnetic flux, Solenoidal nature of vector field of induction, properties of (i) $\vec{\nabla} \times \vec{B} = 0$, (ii) $\vec{\nabla} \cdot \vec{B} = 0$, Electronic theory of dia and paramagnetism, Domain theory of ferromagnetism (Langevin's theory), Cycle of magnetization- hysteresis loop, Energy dissipation, Hysteresis loss and importance of Hysteresis Curve)

Unit 3: Electromagnetism
Maxwell equations and their derivations, Displacement current, Vector and Scalar potentials, Boundary conditions at interface between two different media, Propagation of electromagnetic wave (Basic idea, no derivation), Poynting vector and Poynting theorem

Unit 4: Electromagnetic Induction:
Electromagnetic induction, Faradays law of electromagnetic induction, Lenz's law, Self induction and mutual induction, self inductance of a long solenoid, Mutual induction of long solenoid, Energy stored in an inductor, Growth and decay of current in a circuit with (a) resistance and capacitance (b) resistance and inductance (c) inductance and capacitance (d) resistance, inductance and capacitance. A.C. circuit analysis using complex variable with (a) capacitance and resistance (CR) (b) resistance and inductance (LR) (c) capacitance and inductance (LC) (d) capacitance and inductance (LR) (e) Capacitance, Inductance and Resistance (LCR), Series and parallel resonance circuit,
Quality factor (sharpness of resonance)

Textbooks and references :

1. Electricity and Magnetism by Reitz and Milford (Prentice Hall of India).
2. Electricity and Magnetism by A. S. Mahajan and A. A. Rangwala (Tata McGraw Hill)
3. Electronics & Fundamental by Jonh D. Ryde
4. Basic Electronics and Linear circuites by N. N. Bhargav DC Kulshreshtha and S. C. Gupta(TTTCHO)
5. Introduction to Electronics by E. K. Brauson (Prentice Hall)
6. Electronics Devices and circuit by Motershed

Note:
1. **Nine Questions will be set in total.**
2. **Question number One will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.**
4. **All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.**
6. **20% numerical problems are to be set.**
7. **Use of scientific (non-programmable) calculator is allowed.**

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*Approved by 19th Academic Council held in 14-09-2017 for implementation from the Academic session 2017-18.

B. Sc. I (Non Medical + Computer Science)
Semester -I
Paper III
Subject: Physics
PRACTICAL'S

Course Code: PHP-101
L-T-P
3-0-0
(25+8+7)
(Experiment+ copy+ Viva Voice)

Total Credits: 3

Total Marks: 50 External Marks: 40

Internal Marks: 10(5+5)
(Attendee + Seminar)

Special notes:-

1. **Do any Ten experiments.**
2. **The students are required to calculate the error involved in a particular experiment.**

Experiments

1. To find out the moment of inertia of fly wheel
2. To find the moment of inertia of an irregular using a torsion pendulum.
3. To find the Young's modulus by bending of beam.
4. To determine the modulus of rigidity by Maxwell' needle.
5. To find Young's modulus, modulus of rigidity and Poisson's ratio for the material of a wire by Searle's method.
6. To determine the surface tension of water by noting its rise in a capillary tube.
7. To determine the surface tension of water by Jaeger's method.
8. To find the co-efficient of viscosity of water by noting its flow through a capillary tube of uniform bore
9. To find out the value of g by bar pendulum
10. To find out radius of gyration by bar pendulum
11. To find out thermal conductivity of a good conductor by searle's Method
12. To determine mechanical equivalent of heat by Calander and Barn's method.
13. Basics of computer MS-Word, MS-Excel, MS Powepoint (Compulsory)
14. One day Scientific Tour (Compulsory)

Note:-

1. Practical examination will be held at the end of each semester
2. Pass percentage is 40% and It is necessary to pass in Practical Paper separately
3. The students are required to calculate the error involved in a
4. particular experiment Minimum ten experiments have to be done
5. The practical examination will held in 3 hours
6. Experiment Examination : - 50

Distribution of Marks:-

External Examination : 40(Experiment+Copy+ Viva-Voce)
(25+8+ 7)

Internal Examination : 10 (Seminar + Attendance)
(5+5)

Total Marks : 50

7. For giving Marks and lab record each college will maintain practical assessment record by using the following procedure given below.
8. Each student has to perform a minimum number of experiment prescribed in the syllabus.

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After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voice of each student to find out how much concepts related to the theoretical and experimental part of the experiment she has understood. According to her performance marks will be recorded on their practical notebook. These marks will constitute the lab record.

10. To compute the final marks for lab record, a separate register will be maintained. Each student will be assigned a separate page on this register. On this page the marks obtained by the student in different practical's will be entered. This record will be signed by the concerned teacher.
11. One Day scientific tour is compulsory.

Text books References:

1 Worshnop and Flint, Advanced Practical Physics
2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Books Ltd, New Delhi
3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ram & Sons, Delhi
4 Gupta S L and Kumar V, Practical Physics, Pragati Prakashan, Meerut.

12/8/17

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B. Sc. I (Non Medical + Computer Science)

3196
M-18

Semester-II
Subject: Physics
Paper-I
PROPERTIES OF MATTER AND KINETIC THEORY OF GASES

Course Code: PHY-102-A **Total Credits: 3 L-T-P**
3-0-0 **Total Marks: 50 External Marks: 40**
Internal Marks: 10
(Sessional / project + Attendance)

Unit I: Moment of inertia

Rotation of rigid body, Moment of inertial, Torque, angular momentum, Kinetic energy of rotation. Theorem of perpendicular and parallel axes (with proof). Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross – section, Acceleration of a body rolling down on an inclined plane.

Unit II: Elasticity

Elasticity, Stress and Strain, Hook's law, Elastic constant and their relations, Poisson's ratio, Torsion of cylinder and twisting couple, Bending of beam (Bending moment and its magnitude), Cantilever and Centrally loader beam.

Unit III: Kinetic theory of gases-I

Assumption of Kinetic theory of gases, pressure of an ideal gas (no derivation), Kinetic interpretation of Temperature, Ideal Gas equation, Degree of freedom, Law of equipartition of energy and is application for specific heat of gases, Real gases, Vander wall's equation, Brownian motion(Qualitative).

Unit IV: Kinetic theory of gases –II

Maxwell's distribution of speed and velocities (derivation required), Experimental verification of Maxwell's law of speed distribution, most probable speed, average and r.m.s. speed, Mean free path, Transport of energy and momentum, Diffusion of gases.

Textbooks and References:

1. Properties of Matter by D.S. Mathur.
2. Heat and Thermodynamics (5th Edition) by Mark W. Zermansky.
3. Berkely Physics course,Vol I, Mechanics by E.M. Purchell

Note:-

1. **Nine Questions will be set in total.**
2. **Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.**
4. **All questions will carry equal marks.**

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B. Sc. I (Non Medical + Computer Science)
Semester –II
Subject: Physics
Paper II
SEMICONDUCTOR DEVICES

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M-18

Course Code: PHY-102 -B
3-0-0
Internal Marks: 10
(Sessional / project + Attendance)

Total Credits: 3 L-T-P
Total Marks: 50 External Marks: 40

Unit I: Semiconductors

Energy bands in solids, Intrinsic and extrinsic semiconductors, p-n junction diode and their characteristics, Zener and Avalanche breakdown, Zener diode , Light emitting diodes (LED), Photoconduction in semiconductors, Photodiode, Solar Cell, P-n junction, half wave and full wave rectifiers, Zener diode as a voltage regulator

Unit II: Transistors

Junction transistors, Working of NPN and PNP transistors, Three configurations of transistor (C-B, C-E, C-C modes), Constants of a transistor, Relation between alpha and beta, Common base, Common emitter and common collector characteristics of transistor, Advantages and disadvantages of C-E configuration

Unit III: Transistor Amplifiers

Transistor biasing, Methods a of transistor biasing and stabilization, D.C. load line , Common base and Common emitter biasing, Common base and common emitter amplifiers, Classification of amplifiers, Resistance- Capacitance (RC) coupled amplifier (two stage, concept of band width, no derivation), Feedback in amplifiers, Advantages of negative feedback, Emitter follower

Unit IV: Oscillators

Oscillators, Principle of oscillation, classification of oscillators, Condition for self sustained oscillation: Barkhausen criterion for oscillation, Tuned collector common emitter oscillator, Hartley oscillator, C.R.O. (Principle and working).

Textbooks and References:

1. Basic Electronics and Linear Circuits by N.N.Bhargava, D.C. Kulshreshtha and S.C.Gupta (TTTI CHD).
2. Solid State Electronics by J.P. Aggarwal, Amit Aggarwal (Pragati Prakashan, Meerut).
3. Electronics Fundamentals and Applications by J.D. Ryder (Prentice Hall of India).
4. Solid State Electronics by B.L. Theraja

Note:-

1. **Nine Questions will be set in total.**
2. **Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **For more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.**
4. **All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately**

12/8/17

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#9-

B. Sc. I (Non Medical + Computer Science)
Semester –II
Subject: Physics
Paper III
PRACTICALS

Course Code: PHP - 102
3-0-0
(25+8+7)
(Experiment + copy + Viva Voice)

Total Credits: 3 L-T-P
Total Marks: 50 External Marks: 40

Internal Marks: 10(5+5)
(Attendee + Seminar)

Special notes:-

1. Do any Ten experiments.
2. The students are required to calculate the error involved in a particular experiment.

Experiments

1. To Study forward and reverse Bias Characteristics of a semiconductor diode.
2. To study the Characteristics of a Zener diode.
3. To study the Characteristics of a Solar Cell and find out the Fill Factor.
4. To Study AND, OR and NOT Gate
5. To study NAND and NOR Gate.
6. To find out the Low resistance by Carey Foster Bridge
7. To Find out the high resistance by substitution method.
8. To verify the inverse square law by Photo Cell.
9. To find out the E.C.E of Hydrogen using water Voltammeter.
10. To find out the frequency of A.C. Mains using sonometer.
11. To find out the frequency of A.C. Mains using electrical Vibrator.
12. To find out the Impedance of A.C. mains in given Circuit
13. To find out the Inductance By Anderson Bridge Method.
14. To study the Phenomenon of electromagnetic Induction by Python Language.
15. To find out the value of g using Python Language
16. To plot the Forward and reverse bias characteristics of Diode Using Python Language.
17. Project Work Compulsory)
18. One Scientific Tour (Compulsory)

Notes:-

1. Practical examination will be held at the end of each semester
2. Pass percentage is 40% and It is necessary to pass in Practical Paper separately
3. The students are required to calculate the error involved in a particular experiment Minimum ten experiments have to be done
4. The practical examination will held in 3 hours.
5. Experiment Examination : - 50

Distribution of Marks:-

External Examination - 40(Exp. +Copy+ Viva-Voce)
(25+8+ 7)

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Internal Examination 10 (Seminar Attendance)

Total Marks 50

7. For giving Marks and lab record each college will maintain practical assessment record by using the following procedure given below
8. Each student has to perform a minimum number of experiment prescribed in the syllabus
9. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voice of each student to find out how much concepts related to the theoretical and experimental part of the experiment she has understood. According to her performance marks will be recorded on their practical notebook. These marks will constitute the lab record
10. To compute the final marks for lab record, a separate register will be maintained. Each student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be entered. This record will be signed by the concerned teacher.
11. One Day scientific tour is compulsory

Text books and References:

1 Worshnop and Flint Advanced Practical Physics
2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Bookd Ltd, New Delhi
3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ram & Sons, Delhi
4. Gupta S L and Kumar V, Practical Physics Pragati Prakashan, M

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(State University established under legislature act xxxi of 2006)

Course Curriculum & Scheme of Examination For Physics B. Sc. II (Non Medical + Computer Science) 2017-18

3rd Semester

S. No.	Paper Code	Course Title	Teaching Schedule			Internal Assessment	External Assessment	Credit (Hrs)	Total Marks
			L	T	P				
Paper-I	PHY-201- A	Computer Programming and Thermodynamics	3	0	0	10	40	3	50
Paper-II	PHY-201-B	Wave and Optics -I	3	0	0	10	40	3	50
Paper-III	PHP -201	Practical	0	0	4	10	40	2	50
Total Credits /marks			6	0	4	30	120	8	150

4th Semester

S. No.	Paper Code	Course Title	Teaching Schedule			Internal Assessment	External Assessment	Credit (Hrs)	Total Marks
			L	T	P				
Paper-I	PHY- 202-A	Statistical Physics	3	0	0	10	40	3	50
Paper-II	PHY- 202-B	Wave and Optics - II	3	0	0	10	40	3	50
Paper-III	PHP- 202	Practical	0	0	4	10	40	2	50
Total Credits /marks			6	0	4	30	120	8	150

Note:

1. **Practical examination will be held at the end of each semester**
2. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.**
3. **One Day scientific tour is compulsory.**

*Approved by 19th Academic Council held in 14-09-2017 for implementation from the Academic session 2017-18.

BHAGAT PHOOL SINGH MAHILA VISHWAVIDYALAYA, KHANPUR KALAN(SONEPAT)

(State University established under legislature act xxxi of 2006)

Course Curriculum & Scheme of Examination For Physics B. Sc. III (Non Medical + Computer Science) 2017-18

5rd Semester

S. No.	Paper Code	Course Title	Teaching Schedule			Internal Assessment	External Assessment	Credit (Hrs)	Total Marks
			L	T	P				
Paper-I	PHY-301-A	Quantum and Laser Physics	3	0	0	10	40	3	50
Paper-II	PHY-301-B	Nuclear Physics	3	0	0	10	40	3	50
Paper-III	PHP-301	Practical	0	0	4	10	40	2	50
Total Credits Marks			6	0	4	30	120	8	150

6th Semester

S. No.	Paper Code	Course Title	Teaching Schedule			Internal Assessment	External Assessment	Credit (Hrs)	Total Marks
			L	T	P				
Paper-I	PHY-302-A	Solid State and Nano Physics	3	0	0	10	40	3	50
Paper-II	PHY-302-B	Atomic and Molecular Spectroscopy	3	0	0	10	40	3	50
Paper-III	PHP-302	Practical	0	0	4	10	40	2	50
Total Credits Marks			6	0	4	30	120	8	150

Note:

- Practical examination will be held at the end of each semester
- Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.
- One Day Scientific tour is compulsory.

Approved by 19th Academic Council held in 14-09-2017 for implementation from the Academic session 2017-18.

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D-18

B. Sc. IInd (Non Medical / Computer Science)
Semester –III
Subject: Physics
Paper I
COMPUTER PROGRAMMING AND THERMODYNAMICS

Course Code: PHY- 201-A **Total Credits: 3**
L-T-P
3-0-0 **Total Marks: 50**
External Marks: 40
Internal Marks: 10
(Sessional/Project +Attendance)

UNIT-1: Computer Programming

Computer organization, Binary representation, Algorithm development, Flow charts 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.

UNIT –2: Applications of FORTRAN programming

Algorithm, flow chart and programming for Print out of natural numbers, Range of the set of given numbers, Ascending and descending order, Mean and standard deviation, Least square fitting of curve, Roots of quadratic equation, Product of two matrices, Numerical integration (Trapezoidal rule and Simpson 1/3 rule) .

UNIT-3: Thermodynamics-I

Second law of thermodynamics, its significance, Carnot theorem, Absolute scale of temperature, Absolute Zero, Joule's free expansion, Joule-Thomson effect, Joule-Thomson(Porous plug) experiment, Conclusions and explanation, Analytical treatment of Joule-Thomson effect. Entropy, T-S diagram, Entropy of prefect gas, Nernst heat law (Third law of Thermodynamics), Liquefaction of gases: Oxygen
(Coscade Method), air(Linde's Method), hydrogen(Dewar Method), helium(K Onnes Method).

UNIT-4: Thermodynamics-II

Derivation of Clausius-Clapeyron latent heat equation and their significance, Specific heat of saturated vapours, phase diagram and triple point, Development of Maxwell thermodynamical relations. Thermodynamic function: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and relations between them, Derivation of Maxwells thermodynamical relations from thermodynamical functions, Application of Maxwell relations: relation between two specific heats of gas, derivation of Clausius-Clapeyron equation, variations of intrinsic energy with volume for (i) perfect gas, (ii) Van der wall gas, (iii) solids and liquids, derivation of stefan's law, adiabatic compression and expansion of gas and deduction of theory of joule Thomson effect.

Textbooks and References:

1. Ian C and Malcon C, Interactive FORTRAN 77, Affiliated East West Press

Pvt Ltd, New Delhi
2. Rajaraman V, Computer Programming in FORTRAN 77, Prentice-Hall of India Pvt. Ltd, New Delhi.
3. Suresh C, Computer Applications in Physics, Narosa ublishing House, New Delhi
4. Roy S K, Thermal Physics and Statistical Mechanics, New Age International Publishers, New Delhi
5. Sharma J K and Sarkar K K, Thermodynamics and Statistical Physics, Himalaya Publishing House, Bambay
6. Stowe Keith, Introduction to Thermodynamics and its Applications, University press (India) Pvt Ltd, Hyderabad
7. Infelta Pierre P. Introductory Thermodynamics Publisher: Brown Walker Press
8. Johnson J. K, Fundamentals of Thermodynamics University of Pittsburgh 2009
9. Jefferson Tester, Michael Modell, Thermodynamics and Its Applications 3rd Edition
10. Thomas Engel, Philip Reid, Thermodynamics, Statistical Thermodynamics, & Kinetics 2nd Edition

Note:-

1. Nine Questions will be set in total.

2. Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.

3. For more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.

4. All questions will carry equal marks.

5. Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately

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D-18

B. Sc. II (Non- Medical /Computer Science)
Semester -III
Paper II
Subject: Physics
WAVE OPTICS I

Course Code: PHY-201-B **Total Credits: 3**

L-T-P

3-0-0 **Total Marks: 50**

External Marks: 40

Internal Marks: 10

(Sessional +Attendance)

Unit-I: Interference I

Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine wavelength of sodium light and thickness of a mica sheet, Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes, phase change on reflection.

Unit- II: Interference II

Interference by Division of Amplitude: Plane parallel thin film, Production of colours in thin films, Classification of fringes in films, wedge shaped film, Newton's rings. Interferometers: Michelson's interferometer and its applications to (i) Standardization of a meter (ii) determination of wavelength.

Unit- III: Diffraction I

Fresnel's diffraction: Fresnel's assumptions and half-period zones methods, rectilinear propagation of light, zone plate, diffraction at a straight edge, rectangular slit and circular aperture, Diffraction due to a narrow slit and wire.

Unit –IV: Diffraction II

Fraunhoffer diffraction: Single-slit diffraction, Double slit diffraction, N-slit diffraction, plane transmission granting spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating. Difference between prism and grating spectra.

Textbooks and References

1. Hecht, Optics, Pearson Education, New Delhi
2. Brooker G, Modern Classical Optics, Ane Books Pvt Ltd, New Delhi
3. Chaudhuri R N, Waves and Oscillations, New Age International Publishers, New Delhi
4. Khandelwal D P, Text Book of Optics and Atomic Physics, Himalaya Publishing House Bombay
5. Subrahmanyam N, Lal B, Avadhanulu M N, A Text Book of Optics, S Chand & Co,New Delhi
6. Barton A w, atext Book on Light, Longmans Green & Co London
7. Longhurst R S, Geometrical and Physical Optics, University Press India Pvt Ltd,

Hyderabad.

Note:-

1. Nine Questions will be set in total.
2. Question number 1 will be compulsory and will be based on the conceptual [illegible] entire syllabus. This question may have five parts and the answer should be in brief not in Yes/ No.
3. For more questions are to be attempted, selecting one question out of two questions from each unit. Each question may contain two or more parts.
4. All questions will carry equal marks.
5. Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately

B. Sc. II(Non Medical + Computer Science)
Semester -III

Paper III
Subject: Physics
PRACTICALS

Course Code: PHP – 201
L-T-P
3-0-0
External Marks: 40 (25+8+7)
(Experiment+ copy+ Viva Voice)

Total Credits: 3

Total Marks: 50

Internal Marks: 10(5+5)
(Attendee + Seminar)

Special notes:-

3. **Do any eight experiments.**
4. **The students are required to calculate the error involved in a particular experiment.**

Experiments

1. To measure the (a)Area of window (b)Height of an accessible object.
2. Refractive index of a prism material by spectrometer.
3. Dispersive power a prism material by spectrometer.
4. To draw a graph between wave length and minimum deviation for various lines from mercury discharge source.
5. Determination of wavelength of sodium light and the number of lines per centimeter using a diffraction grating.
6. Wavelength by Newton's rings.
7. Comparison of illuminating power by a photometer.
8. Resolving power of a telescope.
9. To print out all natural numbers between given limits usig computer.
10. Find out the root of a Quadratic equation.
11. To find maximum, minimum and range of a given set of numbers using computer.
12. Toevaluate sum of finite series.
13. To find out area of triangle.
14. To find out area of Sphere.
15. To find out area of Cylinder.
16. To find integration of a definite Integral by hapezodial rule.
17. Project Work Compulsory).
18. One day Scientific Tour (Compulsory).

Note:-

1. Practical examination will be held at the end of each semester
2. Pass percentage is 40% and It is necessary to pass in Practical

Paper separately

3. The students are required to calculate the error involved in a
4. particular experiment Minimum ten experiments have to be done
5. The practical examination will held in 3 hours.
6. Experiment Examination : = 50

Distribution of Marks:-

External Examination = 40(Exp. +Copy+ Viva-Voce)
(25+8+ 7)

Internal Examination = 10 (Seminar Attendance)
(5+5)

Total Marks : 50

7. For giving Marks and lab record each college will maintain practical assessment record by using the following procedure given below.
8. Each student has to perform a minimum number of experiment prescribed in the syllabus.
9. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voice of each student to find out how much concepts related to the theoretical and experimental part of the experiment she has understood. According to her performance marks will be recorded on their practical notebook. These marks will constitute the lab record.
10. To compute the final marks for lab record, a separate register will be maintained. Each student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be entered. This record will be signed by the concerned teacher.
11. One Day scientific tour is compulsory.

Text books and References:

1 Worshnop and Flint, Advanced Practical Physics
2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Bookd Ltd, New Delhi
3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ran & Sons, Delhi
4 Gupta S L and Kumar V, Practical Physics, Pragati Prakashan, Meerut.

B. Sc. II (Non Medical + Computer Science)
Semester -IV
Paper I
Subject: Physics
STATISTICAL PHYSICS

Course Code: PHY-202-A **Total Credits: 3**

L-T-P

3-0-0 **Total Marks: 50**

External Marks: 40

Internal Marks: 10

(Sessional +Attendance)

Course Objectives: To generate the

Unit –I: Statistical Physics I

Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent. Probability, statistical probability, A- priori Probability and relation between them, probability theorems, some probability considerations, combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3 and any number of Coins, Permutations and combinations, distributions of N (for N= 2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macro states, Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes, Condition of equilibrium between two systems in thermal contact-- β parameter, Entropy and Probability (Boltzman's relation).

Unit –II: Statistical Physics II

Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics, basic approach in three statistics. M. B. statistics applied to an ideal gas in equilibrium- energy distribution law (including evaluation of α and β) , speed distribution law & velocity distribution law. Expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution.

Unit-III: Quantum Statistics

Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas, Degeneracy and B.E. Condensation, Fermi-Dirac energy distribution law, F.D. gas and Degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law, Fermi Dirac gas and degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron gas in metals, Zero point energy, Zero point pressure and average speed (at 0 K) of electron gas, Specific heat anomaly of metals and its solution. M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics.

Unit-IV: Theory of Specific Heat of Solids

Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. Specific heat at low temperature, Einstein theory of specific heat, Criticism of Einstein theory, Debye model of specific heat of solids, success and shortcomings of Debye theory, comparison of Einstein and Debye theories.

Textbooks and References

1. Prakash S and Agarwal J P, Statistical Mechanics, Kedar Nath Ram Nath & co, Meerut
2. Reif F, statistical Physics, Berleley Physics Course Volume 5, Mc Graw Hill Book Co Ltd, New Delhi
3. McQuarrie D A, Statistical Mechanics, Viva Books Pvt Ltd, New Delhi.
4. Ashley Carter (August 1999), Classical and Statistical Thermodynamics
5. Richard Fitzpatrick, Thermodynamics and Statistical Mechanics: An intermediate level course Lulu.com..

Note:-

1. **Nine Questions will be set in total.**
2. **Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **For more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.**
4. **All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately**

B. Sc. II (Non Medical + Computer Science)
Semester -IV
Paper II
Subject: Physics
WAVE AND OPTICS- II

Course Code: PHY-202-B
L-T-P
3-0-0
External Marks: 40
Internal Marks: 10
(Sessional +Attendance)

Total Credits: 3

Total Marks: 50

Unit-I: Polarization

Polarization: Polarisation by reflection, refraction and scattering, Law of Malus, Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz).

Unit-II: Fourier analysis

Fourier Theorem and Fourier series, Evaluation of Fourier coefficients, Importance and limitations of Fourier theorem, Fourier series of functions f(x) between limits (i) 0 to 2π (ii) $-\pi$ to $+\pi$ (iii) 0 to π, Application of Fourier Theorem for analysis of complex waves: rectangular and triangular waves, Half and Full wave rectifier outputs.

Unit-III: Fourier transforms

Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals (ii) for solutions of ordinary differential equations (iii) to the following functions following functions:

1 $f(x) = e^{-}$

2 $f(x) = 1 \quad |X| < a$

$\quad\quad 0 \quad |X| > a$

Geometrical Optics I

Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses.

Unit IV: Geometrical Optics II

Chromatic, spherical, coma, astigmatism, distortion and aberrations and their remedies.

Fiber Optics

Optical fiber, Critical angle of propagation, Mode of Propagation, Acceptance a... Fractional refractive index change, Numerical aperture, Types of optics fiber, Norma... frequency, Pulse dispersion, Attenuation, Applications, Fiber optic Commu... Advantages.

Textbooks and References:

1. Born M and Wolf E, Principles of Optics, Pergaman Press
2. Jenkins and white, Fundamentals of Optics, McGraw Hill Book Co Ltd, New Delhi
3. Moller K D, Optics, University Science Books, Mill ally California
4. Tolansky, An Introduction to Interferometery, John Wiley & Sons, New Delhi
5. Shurcliff, Polarized Light Production and Use, Harward University Press, Cambridge, M... A (USA)
6. Arora C L, Refresher Course in Physics Vol II, S Chand and Co, New Delhi.

Note:-

1. **Nine Questions will be set in total.**
2. **Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **For more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.**
4. **All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately**

B. Sc. II(Non Medical + Computer Science)
Semester -IV
Paper III
Subject: Physics
PRACTICALS

Course Code: PHP-202 **Total Credits: 3**
L-T-P
3-0-0 **Total Marks: 50**
External Marks: 40
Internal Marks: 10
(Sessional +Attendance)

Special notes:-
1. Do any ten experiments.
The students are required to calculate the error involved in a particular experiment.

Experiments

1. To find out the Resolving Power of a given Telescope.
2. To Compare the of Illuminating powers of photometer.
3. Measurement of (a) Specific rotation (b) Concentration of sugar solution using polarimeter.
4. Ordinary and extraordinary refractive indices for calcite and quartz.
5. To find out the equivalent focal length of a lens system by nodal slide assembly.
6. To Study of series and parallel resonance circuits.
7. To study Electronic voltmeter measurement of peak, Average and R.M.S. value of signal.
8. To study voltage doubler and trippler circuits.
9. To find integration of a definite integral by Trapezodial rule.
10. Give values of a, b, c and asset of values for the variable x evaluate the function defined by

    F(x)=ax +bx+c if x<d
    F(x)= 0 x=d
    F(x)=ax +bx -c if x>d

11. For each value of X and print the value of X and f(x).
12. Write the program for an arbitrary number of X values.
13. To find out the roots of Quadratic Equation.
14. To Draw common base and emitter characteristics of a transistor and calculate transistor characteristics parameters.
15. To study ripple factor in a D.C. Power supply.
16. To find out the frequency f given tuning fork by Melde's Experiment

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17. To draw frequency response curve of R.C coupled amplifier.
18. Project Work Compulsory).
19. One day Scientific Tour (Compulsory).

Note:-

1. Practical examination will be held at the end of each semester
2. Pass percentage is 40% and It is necessary to pass in Practical Paper separately
3. The students are required to calculate the error involved in a
4. particular experiment Minimum ten experiments have to be done
5. The practical examination will held in 3 hours.
6. Experiment Examination : = 50

Distribution of Marks:-

External Examination = 40(Exp. +Copy+ Viva-Voce)
(25+8+ 7)

Internal Examination = 10 (Seminar Attendance)
(5+5)

Total Marks : 50

7. For giving Marks and lab record each college will maintain practical assessment record by using the following procedure given below.
8. Each student has to perform a minimum number of experiment prescribed in the syllabus.
9. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voice of each student to find out how much concepts related to the theoretical and experimental part of the experiment she has understood. According to her performance marks will be recorded on their practical notebook. These marks will constitute the lab record.
10. To compute the final marks for lab record, a separate register will be maintained. Each student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be entered. This record will be signed by the concerned teacher.
11. One Day scientific tour is compulsory.

Text books References:

1 Worshnop and Flint, Advanced Practical Physics
2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Books Ltd, New Delhi
3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ran & Sons, Delhi
4 Gupta S L and Kumar V, Practical Physics, Pragati Prakashan, Meerut.

5/3/19

B.Sc.-III (Non -Medical /Computer Science)
Semester – V
Subject:Physics
Paper I
QUANTUM AND LASER PHYSICS

Course Code: PHY-301A **Total Credits: 3**

L-T-P

3-0-0 **Total Marks: 50**

External Marks: 40

Internal Marks: 10

(Sessional/project +Attendance)

Unit I: Origin quantum physics (Experimental basis)

_ Overview, scale of quantum physics, boundary between classical and quantum phenomena, Photon, Photoelectric effect, Compton effect (theory and result), Frank-Hertz experiment, de-Broglie hypothesis. Davisson and Germer experiment, G.P. Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertaintyprinciple. Time energy and angular momentum, position uncertainty. Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope,Electron diffraction from a slit. Derivation of 1-D time-dependent Schrodinger wave equation (subject to force, free particle). Time-independent Schrodinger wave equation, eigen values, eigen functions, wave functions and its significance. Orthogonality and Normalization of function, concept of observer and operator. Expectation values ofdynamical quantities, probability current density

Unit II: Application of Schrodinger wave equation:

(i) Free particle in one-dimensional box (solution of Schrodinger wave equation, eigen functions, eigen values, quantization of energy and momentum, nodes and anti nodes, zero point energy).
(ii) One dimensional step potential E > Vo (Reflection and Transmissioncoefficient)
(iii) One dimensional step potential E < Vo (penetration depth calculation).
(iv) One dimensional potential barrier, E > Vo (Reflection and Transmissioncoefficient)
(v) One-dimensional potential barrier, E < Vo (penetration or tunnelingcoefficient).

(vi) Solution of Schrodinger equation for harmonic oscillator (quantization ofenergy, zero point energy, wave equation for ground state and excited states).

Unit III: Laser Physics –I

Absorption and emission of radiation, Main features of a laser: Directionality, highintensity, high degree of coherence, spatial and temporal coherence, Einstein'scoefficients and possibility of amplification, momentum transfer, life time of a level,kinetics of optical absorption (two and three level rate equation, Fuchbauer landerburgformula).population inversion: A necessary condition for light amplification, resonancecavity, laser pumping, Threshold condition for laser emission, line broadeningmechanism, homogeneous and inhomogeneous line broadening (natural, collision and
Doppler broadening).

Unit IV: Laser Physics – II

He-Ne laser and RUBY laser (Principle, Construction and working), Optical properties of semiconductor, Semiconductor laser (Principle, Construction and working),Applications of lasers in the field of medicine and industry.

Textbooks & References:

1 L I Schiff, Quantum Mechanics
2 Bransden B H and Joachain C J, Quantum Mechanics (2000), Pearson Education, New Delhi
3 Liboff R L, Introductory Quantum Mechanics
4 Eisberg R M and Resnick R, Quantum Physics of Atoms Molecules, Solids, Nuclei and Particles, Wiley Eastern Ltd, New Delhi
5 Verdeyen J T, Laser Electronics PHI, New Delhi
6 Thorenton S T and Rex A, Modern Physics, (2007) Cengage Learning, New Delhi
7 Taylor J R, Zafiratos C D and Dubson M A, Modern Physics, 2nd Ed (2004), PHI, NewDelhi
8 Laud B B, Laser Physics

Note:-

1. Nine Questions will be set in total.

2. Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.

3. For more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts.

4. All questions will carry equal marks.

5. Pass percentage is 40% and It is necessary to pass in theory and Practi separatel

B.Sc.-III (Non Medical /Computer Science)
Semester – VI
Subject:Physics
Paper I
SOLID STATE AND NANO PHYSICS

Course Code: PHY-302 -A **Total Credits: 3**

L-T-P

3-0-0 **Total Marks: 50**

External Marks: 40

Internal Marks: 10

(Sessional /Project +Attendance)

Unit I: Crystal Structure I

Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice andbasis, crystal translational vectors and axes. Unit cell and Primitive Cell, Winger Seitzprimitive Cell, symmetry operations for a two dimensional crystal, Bravais lattices in twoand three dimensions. Crystal planes and Miller indices, Interplaner spacing, Crystalstructures of Zinc Sulphide, Sodium Chloride and Diamond.

Unit II: Crystal Structure II

X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods. K-space and reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal latticeto a simple cubic lattice, b.c.c. and f.c.c.

Unit III: Super conductivity

Historical introduction, Survey of superconductivity, Super conducting systems, High TcSuper conductors, Isotopic Effect, Critical Magnetic Field, Meissner Effect, London Theory and Pippards' equation, Classification of Superconductors (type I and Type II),BCS Theory of Superconductivity, Flux quantization, Josephson Effect (AC and DC), Practical Applications of superconductivity and their limitations, power application of superconductors.

Unit IV: Introduction to Nano Physics

Definition, Length scale, Importance of Nano-scale and technology, History of Nantechnology,Benefits and challenges in molecular manufacturing. Molecular assemblerconcept, Understanding advanced capabilities. Vision and objective of Nano-technology,Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology,Materials, Medicine.

Textbooks & References:

1. C. Kittel, *Introduction to Solid State Physics*, 7th Ed (1996) John Wiley & Sons,

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NewDelhi.
2. H. Ibach and H. Lüth, *Solid State Physics, An Introduction to Theory and Exp*
3. Springer-Verlag, Berlin, 1991
4. Pillai O S, *Solid State Physics*, New Age International Publishers (2007)New D
5. Mark R and Denial R, *Nano-tecnology* – A Gentle Introduction to the Next Bi Idea(2002)
6. M. Tinkham, *Introduction to Superconductivity*, McGraw-Hill, New York, 1975
7. Dekkar A J, Solid State Physics (2000), Mc Millan India Ltd New Delhi
8. Ascroft N W and Mermin N D, Solid State Physics (2003) Harcourt Asia, Singapore
9. Keer H V, Solid State Physics (1993), Wiley Eastern Ltd, New Delhi
10. Kachhava C M, Solid State Physics (1990) Tata Mc Graw Hill Co Ltd, New Delhi
11. Gupta, Solid State Physics (1995) Vikas Publishing House Pvt Ltd, New Delhi

Note:-

1. **Nine Questions will be set in total.**
2. **Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **For more questions are to be attempted, selecting one question out of two**
4. **Questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.**

12/8/17

5/13/19

B.Sc.-III (Non Medical /Computer Science)
Semester – V
Subject:Physics
Paper II
NUCLEAR PHYSICS

Course Code: PHY-301 -B **Total Credits: 3**

L-T-P

3-0-0 **Total Marks: 50**

External Marks: 40

Internal Marks: 10

(Sessional +Attendance)

Unit I: Nuclear Structure and Properties of Nuclei

Nuclear composition (p-e and p-n hypotheses), Nuclear properties; Nuclear size, spin, parity, statistics, magnetic dipole moment, quadruple moment (shape concept). Determination of mass by Bain-Bridge, Bain-Bridge and Jordan mass spectrograph. Determination of charge by Mosley Law. Determination of size of nuclei by Rutherford Back Scattering. mass and binding energy, systematic of nuclear binding energy, nuclear Stability

Unit II: Nuclear Radiation decay Processes

Alpha-disintegration and its theory. Energetics of alpha-decay, Origin of continuous beta spectrum (neutrino hypothesis), types of beta-decay and energetics of beta-decay. Nature of gamma rays, Energetics of gamma rays.

Radiation interaction

Interaction of heavy charged particles (Alpha particles); Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Range and straggling of alpha particles. Geiger-Nuttal law. Interaction of light charged particle (Beta-particle), Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles. Interaction of Gamma Ray; Passage of Gamma radiations through matter (Photoelectric, Compton and pair production effect) electron-positron annihilation. Absorption of Gamma rays (Mass attenuation coefficient) and its application.

Unit III: Nuclear Accelerators

Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators.

Nuclear Radiation Detectors.

Gas filled counters; Ionization chamber, proportional counter, G.M. Counter (detailed study), Scintillation counter and semiconductor detector.

Unit IV:

Nuclear reactions.

Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration, Photonuclear reaction, Radiative capture, Direct reaction, Heavy ion reactions and spallation Reactions. Conservation laws, Q-value and reaction threshold.

Nuclear Reactors.

Nuclear Reactors, General aspects of Reactor Design. Nuclear fission and fusion reactors, (Principle, construction, working and use).

References:

1 Kaplan I, Nuclear Physics, 2nd Ed (1962), Oxford and IBH, New Delhi
2 Sriram K, Nuclear Measurement Techniques, (1986), AEWP, New Delhi
3 Tayal D C, Nuclear Physics (1994), HPH, Bombay
4 Ghoshal S N, Atomic and Nuclear Physics Vol II (1994), S Chand & Co New Delhi
5 Srivastava B N, Basic Nuclear Physics, (1993), Pragati Prakashan Meerut
6 Halliday, Introductory Nuclear Physics, Asia Publishing House, New Delhi
7 Sood D D, Ready A V R and Ramamoorthy, Fundamentals of Radiochemistry, IANCAS (2007), BARC, Bombay
8 Cohen B L, Comcepts of Nuclear Physics (1998), Tata Mc Graw Hill, New Delhi
9 Krane K S, Introductory Nuclear Physics (1988), John Wiley & Sons New Delhi
10 Patel S B, Nuclear Physics (1992), Wiley Eastern Ltd, New Delhi
11 Roy R R and Nigam B P, Nuclear Physics (1993), Wiley Eastern Ltd New Delhi.

Note:-

1. **Nine Questions will be set in total.**
2. **Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.**
3. **For more questions are to be attempted, selecting one question out of two**
4. **Questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.**
5. **Pass percentage is 40% and It is necessary to pass in theory and Practical Paper separately.**

B.Sc.-III (Non Medical /Computer Science)
Semester – VI
Paper II
Subject: Physics
ATOMIC AND MOLECULAR SPECTROSCOPY

Course Code: PHY-302-B
L-T-P
3-0-0
External Marks: 40
Internal Marks: 10
(Sessional +Attendance)

Total Credits: 3

Total Marks: 50

Unit – I: Historical background of atomic spectroscopy

Introduction of early observations, emission and absorption spectra, atomic spectra, wave number, spectrum of Hydrogen atom in Balmer series, Bohr atomic model(Bohr's postulates) , spectra of Hydrogen atom , explanation of spectral series in Hydrogen atom, un-quantized states and continuous spectra, spectral series in absorption spectra, effect of nuclear motion on line spectra (correction of finite nuclear mass), variation in Rydberg constant due to finite mass, short comings of Bohr's theory, Wilson sommerfeld quantization rule, de-Broglie interpretation of Bohr quantization law, Bohr's corresponding principle, Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory, Vector atom model: space quantization, electron spin, coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with vector atom model, transition probability and selection rules.

Unit –II: Vector Atom Model (single valance electron)

Orbital magnetic dipole moment (Bohr megnaton), behavior of magnetic dipole in external magnetic filed: Larmors' precession and theorem.

Penetrating and Non-penetrating orbits, Penetrating orbits on the classical model, Quantum defect, spin orbit interaction energy of the single valance electron, spin orbit interaction for penetrating and non-penetrating orbits, quantum mechanical relativity correction, Hydrogen fine spectra, Main features of Alkali Spectra and their theoretical interpretation, term series and limits, Rydeburg-Ritze combination principle. Absorption spectra of Alkali atoms, observed doublet fine structure in the spectra of alkali metals and its Interpretation, Intensity rules for doublets, comparison of Alkali spectra and Hydrogen spectrum.

8/5/13/19

UNIT-III: Vector Atom model (two valance electrons)

Essential features of spectra of Alkaline-earth elements. Vector model for two valance electron atom: application of spectra.

Coupling Schemes:L.S or Russell – Saunders Coupling Scheme and JJ coupling scheme. Interaction energy in L-S coupling (sp, pd configuration). Lande interval rule. Pauli principal and periodic classification of the elements. Interaction energy in JJ Coupling (sp, pd configuration). equivalent and non-equivalent electrons. Two valance electron system-spectral terms of non-equivalent and equivalent electrons, comparison of spectral terms in L-S And J-J coupling. Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin.

Unit –IV: Atom in External Field

Zeeman Effect (normal and Anomalous).Experimental set-up for studying Zeeman effect Explanation of normal Zeeman effect(classical and quantum mechanical). Explanation of anomalous Zeeman effect(Lande g-factor). Zeeman pattern of D1 and D2 lines of Naaton. Paschen-Back effect of a single valence electron system. Weak field Stark effect of Hydrogen atom

Molecular Physics

General Considerations. Electronic States of Diatomic Molecules. Rotational Spectra (Far IR and Microwave Region). Vibrational Spectra (IR Region). Rotator Model of Diatomic Molecule. Raman Effect. Electronic Spectra.

Text Books & References

1 Beiser A, Concept of Modern Physics (1987), Mc Graw Hill Co Ltd, New Delhi
2 Rajab J B, Atomic Physics (2007), S Chand & Co, New Delhi
3 Hewkes J H and Yarwood J Atomic Physics Vol II (1991) Oxford University Press
4 Bransden B H and Joachain C J, Physics of Atoms and Molecules 2nd Ed (2009), Pearson Education, New Delhi
5 Barrwell, Molecular Spectroscopy
6 Ghoshal S N, Atomic and Nuclear Physics Vol I (1996) S Chand & Co, New Delhi
7 Gopalkrishnan K, Atomic and Nuclear Physics (1982), Mc Millan India New Delhi
8 Raj Kumar, Atomic and Molecuter Spectra:Laser , Kedarnath Ram nathpub
9 S L Gupta, V Kumar,R C Sharma, Elements of Spectroscopy,Pragati Prakashan

Note:

1. Nine Questions will be set in total.
2. Question number 1 will be compulsory and will be based on the conceptual aspects of entire syllabus. This question may have five parts and the answer should be in brief but not in Yes/ No.
3. For more questions are to be attempted, selecting one question out of two
4. Questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks
5. Pass percentage is 40% and It is necessary to pass in theory and Practical

Paper separately

Salient Features of Syllabi in Physics

As far as possible to promote: ---

1) Physics Education Through Master Texts :--

It helps in understanding the theoretical and mathematical development of the subject and to create interest in the subject. So we are going to adopt the Master Texts, wherever possible, As our text books.

2) Physics Education Through Experimentation :---

It helps in general to improve scientific attitude. So emphasis is given on the development of experimental skills, data analysis, calculations, and also on the limitations of the experimental method and data and, results obtained.

3) Physics Education Through Problem Solving:---

It helps in understanding the concepts of physics. It under line the strength of equations, formula, graphs, mathematical tools to tackle the problems. So accordingly, we have introduced compulsory problem part in the question paper.

4) Physics Education Through Awareness of Misconceptions :----

It improves the scientific awareness among the students. A discussion on Paradox etc. is encouraged.

5) Physics Education Through Proto-research:

It creates interest in the subject and improves technological aspect. Accordingly, mini projects, hands-on activities, projects, models and demonstrations etc. is included in the syllabi.

6) Physics Education through Qualitative Overview:----

It creates interest in the subject to continue to work in the field of science in general and physics in particular. Accordingly future directions and frontiers of the subject are included in the syllabi.

B. Sc. III(Non Medical + Computer Science)
Semester -V
Paper III
Subject: Physics
PRACTICALS

Course Code: PHP-301 **Total Credits: 3**

L-T-P
3-0-0 **Total Marks: 50**

External Marks: 40 (25+8+7)
(Experiment+copy+ Viva Voice)

Internal Marks: 10(5+5)
(Attendee + Seminar)

Special notes:-
1. Do any eight experiments.
The students are required to calculate the error involved in a particular experiment

Experiments

Section-A

1.Determine the λ_{Na} by Fresnel Byprism .
2. Determine the velocity of ultrasonic in the Kerosene oil.
3. Study double slit interference by He-Ne laser.
4. Determine the diameter of a wire using (He-Ne Laser) diffraction method.
5. Determine e/m by Thomson's method.
6. Study the B H curve using oscilloscope.
7. Measurement of energy band gap of Ge/Si by four probe method.

Section -B

1.Compute the product of two matrices of different dimension using DO Loop.
2.Numerical integration by Simpson 1/3 rule.
3.Fitting of a straight line using Least-Square method..
4. Using array variable, find out the average and standard deviation.

Note:-

1.Practical examination will be held at the end of each semester
2.Pass percentage is 40% and It is necessary to pass in Practical Paper separately
3.The students are required to calculate the error involved in a
4.particular experiment Minimum ten experiments have to be done
5.The practical examination will held in 3 hours.

6.Experiment Examination : = 50

Distribution of Marks:-

External Examination = 40(Exp. +Copy+ Viva-Voce)
(25+8+ 7)

Internal Examination = 10 (Seminar Attendance)
(5+5)

Total Marks : 50

7. For giving Marks and lab record each college will maintain practical assessment record by using the following procedure given below.
8. Each student has to perform a minimum number of experiment prescribed in the syllabus.
9. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voice of each student to find out how much concepts related to the theoretical and experimental part of the experiment she has understood. According to her performance marks will be recorded on their practical notebook. These marks will constitute the lab record.
10. To compute the final marks for lab record, a separate register will be maintained. Each student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be entered. This record will be signed by the concerned teacher.
11. One Day scientific tour is compulsory.

Text books References:

1 Worshnop and Flint, Advanced Practical Physics
2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Books Ltd, New Delhi
3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ran & Sons, Delhi
4 Gupta S L and Kumar V, Practical Physics, Pragati Prakashan, Meerut.

B. Sc. III(Non -Medical + Computer Science)
Semester -VI
Paper III
Subject: Physics
PRACTICALS

Course Code: PHP-302 **Total Credits: 3**

L-T-P
3-0-0 **Total Marks: 50**

External Marks: 40 (25+8+7)
(Experiment+copy+ Viva Voice)

Internal Marks: 10(5+5)
(Attendee + Seminar)

Special notes:-
1. Do any Eight experiments.
The students are required to calculate the error involved in a particular experiment

Experiments

Section -A

1.Thickness of a paper using interference fringes in an air wedge.
2. Determine the resolving power of a prism.
3.Determine the resolving power of a transmission grating.
4.. Determine the R_H by grating and Hydrogen tube.
5. Study the C B transistor amplifier.
6. Study the C B transistor amplifier.
7.(a) Draw the plateau using G M counter.
(b) Determine the mass attenuation coefficient by G M counter.
8. Determine the R_H by grating and Hydrogen tube
9. Study the Hall effect.
10. To study Hartley oscillator.

Section -B

1.Compute the sum of a finite series up to correct three decimal place
2. With the help of a program arrange the marks in ascending of descending Order
3.Write a program to evaluate the function $Y=1/|C(1+e\cos\theta)|$
and $V=\sqrt{|C M G(e2+e\cos\theta+1)|}$ $e = 1.1$, $C = 3.0(E+08)$,
$M = 5.893(E+24)$, $G = 6.67(E-11)$ for varying value of θ from 0 to π.

Note:-

1.Practical examination will be held at the end of each semester
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Paper separately

3.The students are required to calculate the error involved in a

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5.The practical examination will held in 3 hours.

6.Experiment Examination : = 50

Distribution of Marks:-

External Examination = 40(Exp. +Copy+ Viva-Voce)
(25+8+ 7)

Internal Examination = 10 (Seminar Attendance)
(5+5)

Total Marks : 50

7. For giving Marks and lab record each college will maintain practical assessment record by using the following procedure given below.
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