

# DEPARTMENT OF PHYSICS

## COURSE CURRICULUM & MARKING SCHEME

### M.Sc. PHYSICS

### Semester - III

SESSION : 2023-24



ESTD: 1958

## GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A<sup>+</sup>, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - [www.govtsciencecollegedurg.ac.in](http://www.govtsciencecollegedurg.ac.in), Email – [autonomousdurg2013@gmail.com](mailto:autonomousdurg2013@gmail.com)

**DEPARTMENT OF PHYSICS**  
**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG**

**Programme Outcomes (POs)**

**At the end of M. Sc. (Physics) students will be able to:**

- PO1: Knowledge:** Acquire an overview of concepts, fundamentals and advancements of science across a range of fields, with in-depth knowledge in at least one area of study. Develop focused field knowledge and amalgamate knowledge across different disciplines.
- PO2: Complementary skills:** Students will be able to engage in critical investigation through principal approaches or methods and through effective information search and evaluation strategies. Employ highly developed conceptual, analytical, quantitative and technical skills and are adept with a range of technologies
- PO3: Applied learning:** Students will be able to apply disciplinary or interdisciplinary learning across multiple contexts, integrating knowledge and practice. Recognize the need for information; effectively search for, evaluate, manage and apply that information in support of scientific investigation or scholarly debate
- PO4: Communication:** Communicate effectively on scientific achievements, basic concepts and recent developments with experts and with society at large. Able to comprehend and write reports, documents, make effective presentations by oral and/or written form.
- PO5: Problem-solving:** Investigate, design and apply appropriate methods to solve problems in science, mathematics, technology and/or engineering.
- PO6: Environment and sustainability:** Understand the impact of the solutions in ethical, societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
- PO7: Teamwork, collaborative and management skills:** Recognize the opportunities and contribute positively in collaborative scientific research. Engage in intellectual exchange of ideas with researchers of other disciplines to address important research issues

## Programme Specific outcomes

At the end of M. Sc. (Physics) students will be able to:

- PSO1** Students are expected to acquire core knowledge in modern physics, including the major premises of classical mechanics, electromagnetic theory, and optical electronics.
- PSO2** Students are also expected to develop written and oral communication skills in optical fibre communicating physics-related topics.
- PSO3** Students would learn how to design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.
- PSO4** Students are expected to understand the analytical methods required to interpret and analyze results and draw conclusions as supported by the experimental data or existing theories.

### Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert .....	1. H.O.D Dr. Jagjeet Kaur Saluja .....
Subject Expert.....	2. Dr. R. S. Singh .....
Alumni (member).....	3. Dr. Anita Shukla .....
Prof. from other Dept. of Sc. Faculty .....	4 Mrs. Siteshwari Chandrakar .....
Specialist from Industry.....	5. Dr. Abhishek Kumar Misra .....
	6. Dr. Kusumanjali Deshmukh.....

**DEPARTMENT OF PHYSICS**  
**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG**  
**Approved syllabus for M.Sc. (PHYSICS) Semester III by the members of Board of**  
**Studies**  
**for the Session 2023-24**

Semester III

The syllabus with the paper combinations is as under

<b>Paper I</b> MPH301: CONDENSED MATTER PHYSICS	<b>Paper II</b> MPH302: NUCLEAR & PARTICLE PHYSICS
<b>Paper III</b> MPH303: Special Paper-I (ELECTRONICS)	<b>Paper IV</b> MPH304: Special Paper-II (ELECTRONICS)
<b>Paper V</b> MPHL05: Lab Course I - GENERAL	<b>Paper VI</b> MPHL06: Lab Course II - ELECTRONICS

Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert .....	1. H.O.D Dr. Jagjeet Kaur Saluja .....
Subject Expert.....	2. Dr. R. S. Singh .....
Alumni (member).....	3. Dr. Anita Shukla .....
Prof. from other Dept. of Sc. Faculty .....	4 Mrs. Sitieshwari Chandrakar .....
Specialist from Industry.....	5. Dr. Abhishek Kumar Misra .....
	6. Dr. Kusumanjali Deshmukh.....

**Syllabus and Marking Scheme for M.Sc. (Physics) Semester III  
Session 2022-23**

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment	
		Max	Min	Max.	Min.
I	MPH301: CONDENSED MATTER PHYSICS	80	16	20	04
II	MPH302: NUCLEAR & PARTICLE PHYSICS	80	16	20	04
III	MPH303: SPECIAL PAPER-I (ELECTRONICS)	80	16	20	04
IV	SPECIAL PAPER-II (ELECTRONICS)	80	16	20	04
V	LAB COURSE I- A (GENERAL)	100	34		
VI	LAB COURSE II- B (ELECTRONICS)	100	34		
	<b>Total</b>	<b>520</b>		<b>80</b>	

04 Theory papers	-	320
04 Internal Assessments	-	80
02 Practicals	-	200
<b>Total Marks</b>	-	<b>600</b>

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>Namrata</i> <i>26/01/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>Jagjeet</i> <i>26/1/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R.S. Singh</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>Anita Shukla</i>
Prof. from other Dept. of Sc. Faculty ..... <i>Raj</i> <i>26/1/22</i>	4 Mrs. Sitieshwari Chandrakar .....
Specialist from Industry..... <i>Raj</i>	5. Dr. Abhishek Kumar Misra .....
	6. Dr. Kusumanjali Deshmukh..... <i>Kusumanjali</i> <i>26/1/22</i>

**The Scheme of Internal Assessment**  
**Session 2023-24**  
**M.Sc. (Physics) Semester III**

Paper No.	Paper Name	Test Marks I	Test Marks II	Home Assignment/Seminar III	Total
I	MPH301: CONDENSED MATTER PHYSICS	20 Marks	20 Marks	20 Marks	Average of Best of Test and Home Assignment/Seminar(20 Marks)
II	MPH302: NUCLEAR & PARTICLE PHYSICS	20 Marks	20 Marks	20 Marks	Average of Best of Test and Home Assignment/Seminar(20 Marks)
III	MPH303: SPECIAL PAPER-I (ELECTRONICS)	20 Marks	20 Marks	20 Marks	Average of Best of Test and Home Assignment/Seminar(20 Marks)
IV	MPH304: SPECIAL PAPER-II (ELECTRONICS)	20 Marks	20 Marks	Only one seminar (20 marks) Presentation (10 marks) Viva (10marks)	Average of Best of Test and Home Assignment/Seminar(20 Marks)

Note: Compulsory submit one hardcopy and softcopy of ppt after presentation.

Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>9/Janmeet 26/10/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja <i>J.K. Saluja 26/10/22</i>
Subject Expert.....	2. Dr. R. S. Singh <i>R.S. Singh 26/10/22</i>
Alumni (member).....	3. Dr. Anita Shukla <i>Anita Shukla 26/10/22</i>
Prof. from other Dept. of Sc. Faculty .....	4 Mrs. Sitieshwari Chandrakar <i>Sitieshwari Chandrakar 26/10/22</i>
Specialist from Industry..... <i>Dr. R. S. Singh 26/10/22</i>	5. Dr. Abhishek Kumar Misra <i>Abhishek Kumar Misra 26/10/22</i>
	6. Dr. Kusumanjali Deshmukh <i>Kusumanjali Deshmukh 26/10/22</i>

## Question Paper Format and Distribution of Marks for PG Semester Examination

Question paper format for the Post-Graduate Examination have the following main points

The question paper will be of **80 marks**

1. Questions will be asked Unit-wise in each question paper.
2. From each Unit, the questions will be asked as follows:

- Q.1 Very short answer type question  
(Answer in one or two sentences) (02 Marks)
- Q.2 Very short answer type question  
(Answer in one or two sentences) (02 Marks)
- Q.3 Short answer type question (Answer in 200-250 words) (04 Marks)
- Q.4 Long answer type questions (Answer in 400-450 words) (12 Marks)

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
Very Short (2 Questions) (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
Short (1 Question) 200-250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
Long answer (1 Question) 400- 450 words	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

### Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.

Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.

4. Internal Assessment Examination will be as follows:
  - i. Two Internal Test in each paper (20 marks).
  - ii. Seminar (Power point presentation) in any one of the papers (20 marks).
  - iii. Assignment in each of the remaining papers (excluding the paper of Seminar(20 marks).
  - iv. Average of marks obtained in best of internal test + seminar in any one paper and marks obtained in best of internal test + assignment in rest of the papers will be calculated and taken into consideration.

### Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>[Signature]</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>[Signature]</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>[Signature]</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>[Signature]</i>
Prof. from other Dept. of Sc. Faculty .....	4 Mrs. Siteshwari Chandrakar .....
Specialist from Industry..... <i>[Signature]</i>	5. Dr. Abhishek Kumar Misra .....
	6. Dr. Kusumanjali Deshmukh..... <i>[Signature]</i>

GOVT. V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

2023-24

M.Sc. (Physics) Semester- III

Paper - I

MPH301: CONDENSED MATTER PHYSICS

Course Outcomes

This course acts as a bridge between a physicist and a material scientist.  
After successful completion of the course, the student would be able to:

- CO1 Have basic knowledge of crystal systems and spatial symmetries, - be able to account for how crystalline materials are studied using diffraction, including concepts like reciprocal lattice and Brillouin zones
- CO2 Know what phonons are, and be able to perform estimates of their dispersive and thermal properties, be able to calculate thermal and electrical properties in the free-electron model
- CO3 Know Bloch's theorem and what energy bands are and know the fundamental principles of semiconductors and explain superconductivity using BCS theory
- CO4 Understand basic models of dia, para and ferro magnetism and theories of spin waves, Bloch laws and classify them.

Name and Signatures

Name and Signatures	
V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/07/22</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>26/7/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>26/7/22</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>26/7/22</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/7/22</i>	4 Mrs. Siteshwari Chandrakar ..... <i>26/7/22</i>
Specialist from Industry..... <i>26/7/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>26/7/22</i>
	6. Dr. Kusumanjali Deshmukh..... <i>26/7/22</i>



GOVT. V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

SYLLABUS FOR (2023-24)

M.Sc. (Physics) Semester- III

Paper - I

MPH301: CONDENSED MATTER PHYSICS

Min. Marks: 16

Max. Marks:80

- UNIT-I** Crystalline solids, Unit cells and direct lattice, two and three dimensional Bravais lattice, closed packed structures, Interaction of X-rays with matter, absorption of X-rays. Elastic scattering from a perfect lattice. The reciprocal lattice and its applications to diffraction techniques. The Laue, powder and rotating crystal methods, crystal structure factor and Intensity of diffraction maxima.
- UNIT-II** Classification of defects, Point defects Lattice vacancies, Schottky defect, Frankel defect, Extrinsic vacancies, Colour centres: F-centres. Line defects: Edge dislocation, Screw dislocation, Plane defects: Grain boundaries, stacking fault, The role of dislocations in plastic deformation and crystal growth.
- UNIT-III** Nearly free electron model, Bloch theorem, Origin of energy gap, Brillouin zones, Distinction between metals, insulators and semiconductors, Direct and indirect band gap semiconductor, equation of motion of electron in an energy band, concept of holes, effective mass, mobility, Construction of Fermi surface, reduced and periodic zone Schemes, Experimental methods for fermi surface study (i) de Haas Von Alfen Effect (ii) Cyclotron Resonance (iii) Magneto resistance Super conductivity, experimental survey, Meissner effect, Energy gap, Isotope effect, London equation, cooper pairs, BCS theory, Type I & Type II Superconductor, DC & AC Josephson Effect.
- UNIT-IV** Classification of magnetic substances, Langevin's Diamagnetic equation, Quantum theory of paramagnetism & curie law, Weiss theory of ferromagnetism, Heisenberg's exchange interaction, analysis of exchange integral, Ferromagnetic spin waves & magnon dispersion relation, Bloch T<sup>3/2</sup> law, Ferromagnetic order, structure of ferrites. Anti ferromagnetic ordering, Anti ferromagnetic magnons, Origin of ferromagnetic domains, Anisotropy energy, Bloch wall, exchange energy.

REFERENCES:

1. C.Kittle – Solid state physics.
2. Verma Shrivastava – Crystallogepy
3. Singhal.
4. Dekkar.
5. Saxena Gupta Saxena.

Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>J. Anand</i> 26/07/2022	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>J. Anand</i> 26/07/22
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R. S. Singh</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>Anita Shukla</i>
Prof. from other Dept. of Sc. Faculty ..... <i>P. K. Singh</i> 26/07/22	4 Mrs. Sitieshwari Chandrakar ..... <i>Sitieshwari Chandrakar</i>
Specialist from Industry..... <i>P. K. Singh</i> 26/07/22	5. Dr. Abhishek Kumar Misra ..... <i>Abhishek Kumar Misra</i>
	6. Dr. Kusumanjali Deshmukh..... <i>Kusumanjali Deshmukh</i> 26/07/22

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

2023-24

M.Sc. (Physics) Semester- III

Paper - II

MPH302: NUCLEAR & PARTICLE PHYSICS

**Course Outcomes**

After successful completion of the course the student would be able to

- CO1 Acquire clear understanding of nuclear interaction, scattering and correlate data to retrieve information about nuclear structure.
- CO2 Visualize nuclear models with the help of various experimental evidences.
- CO3 Acquire knowledge about nuclear decay processes and build idea about nuclear phenomena.
- CO4 Recognize different interactions of elementary particles and classify them based on their characteristics.

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>24/07/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>26/7/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>26/7/22</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>26/7/22</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/7/22</i>	4 Mrs. Siteshwari Chandrakar ..... <i>26/7/22</i>
Specialist from Industry..... <i>26/7/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>26/7/22</i>
	6. Dr. Kusumanjali Deshmukh..... <i>26/7/22</i>

**GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)**  
**SYLLABUS FOR (2023-24)**  
**M.Sc. (Physics) Semester- III**  
**Paper - II**  
**MPH302: NUCLEAR & PARTICLE PHYSICS**

Min.Marks: 16

Max. Marks:80

- UNIT-I Nuclear Interaction & Nuclear Reaction:** Nucleon-nucleon interaction, Exchange forces, Meson theory of nuclear forces, nucleon-nucleon scattering, Effective range theory, spin dependence of nuclear forces.  
 Direct and compound nuclear reaction mechanism, close reaction in terms of partial wave amplitudes, compound nucleus, Reciprocity theorem, Breit-Wigner one level formula.
- UNIT-II Nuclear Models :** Liquid drop model, Bohr-Wheeler theory of fission, Experimental evidence for shell effects, shell model, Spin orbit coupling, Magic numbers, angular momentum and parity of nuclear ground states qualitative discussion and estimates of transition rates. Magnetic moments and Schmidt lines, collective model of Bohr and Mottelson.
- UNIT-III Nuclear Decay :** Gamow theory of  $\alpha$ -decay, Barrier penetration; Shape of  $\beta$ -spectrum, Parity violation, Fermi theory of  $\beta$ -decay, total decay rate, allowed and forbidden transitions in  $\beta$ -decay; Multipole radiative transitions in nuclei ( $\gamma$ -radiation), Angular momentum and parity selections rules in multipole radiation, Internal conversion, Nuclear isomerism, Mossbauer effect.
- UNIT-IV Elementary Particle Physics :** Types of interactions between elementary particles, Hadrons and Leptons, Symmetry and conservation laws, Strangeness, Hypercharge, CPT invariance; Classification of elementary particles, Basic idea of SU(2) symmetry, SU(3) symmetry and Quark model, Flavour and Colour of Quarks, Gellmann-Nishijima formula, Gell-Mann Okubo Mass Formula, Standard Model.

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/10/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>26/10/2022</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>26/10/2022</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>26/10/2022</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/10/2022</i>	4 Mrs. Sitieshwari Chandrakar ..... <i>26/10/2022</i>
Specialist from Industry..... <i>26/10/2022</i>	5. Dr. Abhishek Kumar Misra ..... <i>26/10/2022</i>
	6. Dr. Kusumanjali Deshmukh..... <i>26/10/2022</i>

**REFERENCES :**

1. Introduction to Nuclear Physics by H.A. Enge
2. Introduction to Elementary Physics by D. Griffith
3. Introductory Nuclear Physics by Kenneth S. Krane
4. Nuclear & Particle Physics by B. R. Martin
5. Fundamentals in Nuclear Physics by J. Basdevant, J. Rich & M. Sipro
6. Atomic and Nuclear Physics by Ghoshal
7. Elements of Nuclear Physics by Pandya & Yadav
8. Nuclear Physics by D. C. Tayal

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/01/2022</i> <i>[Signature]</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>[Signature]</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>[Signature]</i>
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	6. Dr. Kusumanjali Deshmukh..... <i>[Signature]</i>

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

2023-24

M.Sc. (Physics) Semester- III

Paper - III

MPH303: Special Paper-I (ELECTRONICS)

Course Outcomes

After successful completion of the course the student would be able to:

- CO1 Know and discuss differential amplifier circuits.
- CO2 Apply knowledge of OPAMP and analyse its block diagram and different configurations
- CO3 Understand and explain Summing Amplifier, Differentiator, Integrator, Clipping Clamping circuits, Multi-vibrators
- CO4 Describe and discuss applications of OP-AMP as oscillators in all configurations.

Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>Namita</i> <i>26/07/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>Jagjeet</i> <i>26/07/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R.S. Singh</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>Anita Shukla</i>
Prof. from other Dept. of Sc. Faculty ..... <i>P. Singh</i> <i>26/07/22</i>	4 Mrs. Sitieshwari Chandrakar ..... <i>Sitieshwari</i>
Specialist from Industry..... <i>Dingher</i>	5. Dr. Abhishek Kumar Misra ..... <i>Abhishek</i>
	6. Dr. Kusumanjali Deshmukh..... <i>Kusumanjali</i> <i>26/07/22</i>

**GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)**  
**SYLLABUS FOR (2023-24)**  
**M.Sc. (Physics) Semester- III**  
**Paper - III**

**MPH303: Special Paper-I (ELECTRONICS)**

Min. Marks: 16

Max. Marks: 80

**UNIT-I DIFFERENTIAL AMPLIFIERS:** Circuit configurations, Dual-Input Balanced-output differential amplifier: DC analysis, AC analysis, Inverting and non-inverting inputs, common-mode rejection ratio. Dual-input unbalanced-output differential amplifier: DC analysis, AC analysis. Single-input, Balanced-output differential amplifier: DC analysis, AC analysis. Single-input unbalanced-output differential amplifier: DC analysis, AC analysis. FET differential amplifiers, Differential amplifiers with swamping resistors, Constant current bias, current mirror, cascaded differential amplifier stages, cascode or CE-CB configuration.

**UNIT-II OP-AMP :** Block diagram of an op-Amp; Analysis of Typical OP-AMP equivalent circuits schematic symbol open loop OP-AMP configuration. Differential amplifier using OP-AMP, inverting amplifier, non - inverting amplifier. An OP - AMP with negative feedback, closed loop Voltage gain, Difference input Voltage ideally zero, Input resistance with feedback, output resistance with feedback, Band width with feedback. Total output offset Voltage with feedback, Voltage follower.  
**PRACTICAL OP-AMP-** Introduction, Input offset Voltage, Input offset,current. Common mode configuration and CMRR, CMRR as a function of frequency.

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/07/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>26/7/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>26/7/22</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>26/7/22</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/7/22</i>	4 Mrs. Siteshwari Chandrakar ..... <i>26/7/22</i>
Specialist from Industry..... <i>26/7/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>26/7/22</i>
	6. Dr. Kusumanjali Deshmukh..... <i>26/7/22</i>

**UNIT-III**

**OP-AMP as:** DC & AC Amplifiers, Summing Amplifiers: inverting configuration, Non-inverting configuration, Differential configuration. Scaling Amplifiers: inverting configuration, Non-inverting configuration, Differential configuration. Averaging Amplifiers: inverting configuration, Non-inverting configuration, Differential configuration. Differentiator, Integrator, Clipping and Clamping circuits, Comparators, 555 Timer: 555 as a monostable Multi-vibrators, Monostable multivibrator applications, 555 as an Astable multivibrator, Astable multivibrator applications. Frequency to Voltage and voltage to frequency Converters.

**UNIT-IV**

**APPLICATIONS OF OP-AMP-** As Oscillator, Oscillator Principle, Phase shift Oscillator, wean bridge Oscillator, square wave generator, Triangular wave generator, Active Filters- First order Low Pass Butter worth filters filter design and frequency scaling. Second order low pass butter worth filter- filter design, First order high pass butter worth filter, Second order high pass butter worth filter, higher filters Band pass filters – wide band pass filter narrow band pass filter, band Reject filters- wide band reject filters, narrow band reject filter, All pass filter.

**REFERENCES:**

1. OP-AMP and linear Integrated Circuits- Ramakant Gayakwad, PHI, New Delhi.
2. Linear Interated Circuit and Application by Godse and Baksi (Technical Publication)

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>7/Janet 26/1/22</i> <i>Mhpb</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>Jagjeet 26/1/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R.S.S.</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>AS</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/1/22</i>	4 Mrs. Sitieshwari Chandrakar ..... <i>SC</i>
Specialist from Industry..... <i>D. S. K.</i>	5. Dr. Abhishek Kumar Misra ..... <i>AKM</i>
	6. Dr. Kusumanjali Deshmukh..... <i>K.D.</i>

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)  
2023-24

M.Sc. (Physics) Semester- III  
Paper - IV

MPH304: Special Paper-II (ELECTRONICS)

Course Outcomes

After successful completion of the course, the student would be able to

- CO1 Understand different types of Flip-flops and apply them in shift registers and counters
- CO2 Discuss working of Opto electronic devices and design digital display units.
- CO3 Analyses Principles microwave communication systems.
- CO4 Discuss and demonstrate principle and arrangements of radar system.

Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/09/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>28/9/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>28/9/22</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>28/9/22</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/9/22</i>	4 Mrs. Siteshwari Chandrakar ..... <i>28/9/22</i>
Specialist from Industry..... <i>26/9/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>28/9/22</i>
	6. Dr. Kusumanjali Deshmukh. .... <i>28/9/22</i>



**GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)**  
**SYLLABUS FOR (2023-24)**  
**M.Sc. (Physics) Semester- III**  
**Paper - IV**

**MPH304: Special Paper-II (ELECTRONICS)**

Min. Marks: 16

Max. Marks:80

- UNIT-I**      **Combinational Logic:** Half and full adders, half and full subtractors, binary adders, 8421 adders, 2's compliment adder subtractor, Decoder, Encoder Multiplexer.  
**Sequential Logic:** Latch, Flip-flops: RS Flip-flop, level clocking, Edge triggered Flip Flops, D Flip flops. JK Flip-flops, J.K. master slave Flip-flops, Registers: shift and control shift registers, counters: ripple synchronous & ring counters.
- UNIT-II**      **OPTO ELECTRONICS** – Photo detector, Photo conductor, photo diode LED and LCD display system. Measuring instruments with LED indicators, LED numeric and alphanumeric display units, Digital instruments, Advantages of digital instruments. Digital display method, Digital display units, seven segment display and Accuracy for Digital meters.
- UNIT-III**    **MICROWAVE COMMUNICATION** - Principles of two cavity klystrons & reflex klystrons, principle of operation of magnetron, Traveling wave Tubes (TWT) Gunn Effect, Advantages and disadvantages of microwave communication.
- UNIT-IV**    **RADAR SYSTEMS** – Principle of RADAR, basic arrangement of Radar System, Azimuth & Range measurement, Characteristics of Radar system, Radar Transmitting systems, Radar antennas, Radar receivers.  
**SATELLITE SYSTEM-** Function of a Communication satellite. Geo-stationary and Geo synchronous orbit, satellite and earth station geometry.

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/10/2022</i> <i>[Signature]</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>[Signature]</i> <i>26/10/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>[Signature]</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>[Signature]</i>
Prof. from other Dept. of Sc. Faculty ..... <i>[Signature]</i> <i>26/10/22</i>	4 Mrs. Siteshwari Chandrakar ..... <i>[Signature]</i>
Specialist from Industry..... <i>[Signature]</i>	5. Dr. Abhishek Kumar Misra ..... <i>[Signature]</i>
	6. Dr. Kusumanjali Deshmukh. .... <i>[Signature]</i> <i>26/10/22</i>

**REFERENCES:**

1. Handbook of Electronics by Kumar & Gupta
2. Fundamental; of Digital Circuit by A. Anand Kumar
3. Digital Electronics by R.P. Jain
4. Microwave devices and circuits by Samuel Y. liao
5. Microwave & Radar Engineering by M. Kulkarni
6. Satellite Communication by D.C. Agrawal
7. Semiconductor devices phy. & Tech.by S.M.Sze.
8. Introduction to semiconductor device by M.S.Tyagerajan

**Name and Signatures**

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>Dr. Kamal</i> <i>26/07/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>JKaur</i> <i>26/7/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R.S.Singh</i> <i>26/7/22</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>Anita Shukla</i>
Prof. from other Dept. of Sc. Faculty ..... <i>P. S. Singh</i> <i>26/7/22</i>	4 Mrs. Sitieshwari Chandrakar ..... <i>Sitieshwari</i>
Specialist from Industry..... <i>D. Singh</i> <i>26/7/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>Abhishek</i>
	6. Dr. Kusumanjali Deshmukh ..... <i>Kusumanjali</i> <i>26/7/22</i>

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

2023-24

M.Sc. (Physics) Semester- III

Paper – V

MPHL05: LAB-COURSE I – GENERAL

Course Outcomes

Students are expected to understand working mechanics and factors governing electrical and magnetic properties of material. Students will be able to

- CO1 Design and resolve circuits for electronic applications.
- CO2 Record data as required by the experimental objectives.
- CO3 Analyse recorded data and formulate it to get desired results.
- CO4 Interpret results and check for attainment of proposed objective.

Name and Signatures

Name and Signatures	
V.C. Nominee .....	Departmental members
Subject Expert ..... <i>26/07/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>26/7/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>RSS</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>AS</i>
Prof. from other Dept. of Sc. Faculty ..... <i>26/7/22</i>	4 Mrs. Sitieshwari Chandrakar ..... <i>SC</i>
Specialist from Industry..... <i>D. Singh</i>	5. Dr. Abhishek Kumar Misra ..... <i>AKM</i>
	6. Dr. Kusumanjali Deshmukh ..... <i>26/7</i>

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

SYLLABUS FOR (2023-24)

M.Sc. (Physics) Semester- III

Paper – V

MPHL05: LAB-COURSE I - GENERAL

Min. Marks: 34

Max. Marks: 100

Scheme of Marks:

Max. Marks: 100 marks

Expt : 60 marks

Sessional: 20 marks

Viva: 20 marks

List of Experiments

1. Study of Network theorems.
2. Study of LED
3. Study of characteristics of G.M. counter & determination of operating voltage.
4. Numerical, aperture of Optical fibre.
5. Study of clipping and clamping circuits.
6. Determination of Stefan's constant.
7. Study of Hall Effect.
8. Study of bending losses of optical fiber.
9. Attenuation constant of optical fiber.
10. Distinction between actual & Virtual source using laser.
11. Refractive index of glass using laser.
12. Quinke's method.
13. Slit width-using laser.
14. B-H curve & Hysteresis loss.
15. Study of thermo-luminescence.
16. Determination of the number of counts at various distances between the radio active Source & the tube
17. Determination of the effect of various obstacle at the number of Counts between radio active source & tube.
18. To study the variation of leakage current with change in Temperature.
19. Rydberg Constant.
20. Dielectric constant for liquid.

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>9/Jan 2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>26/12/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>26/12/22</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>26/12/22</i>
Prof. from other Dept. of Sc. Faculty .....	4 Mrs. Sitieshwari Chandrakar ..... <i>26/12/22</i>
Specialist from Industry..... <i>26/12/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>26/12/22</i>
	6. Dr. Kusumanjali Deshmukh ..... <i>26/12/22</i>

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

2023-24

M.Sc. (Physics) Semester- III

Paper – VI

MPHL06: LAB-COURSE II- ELECTRONICS

Course Outcomes

Students will be able to:

- CO1 Design and resolve circuits for electronic applications.
- CO2 Record data as required by the experimental objectives.
- CO3 Analyse recorded data and formulate it to get desired results.
- CO4 Interpret results and check for attainment of proposed objective.

Name and Signatures

V.C. Nominee .....	Departmental members
Subject Expert ..... <i>N. Meekhi</i> <i>26/07/2022</i> <i>M. P. B.</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>J. K. Saluja</i> <i>26/07/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R. S. Singh</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>Anita Shukla</i>
Prof. from other Dept. of Sc. Faculty ..... <i>P. S. Chandra</i> <i>26/07/22</i>	4 Mrs. Siteshwari Chandrakar ..... <i>S. Chandrakar</i> <i>26/07/22</i>
Specialist from Industry..... <i>S. S. S.</i>	5. Dr. Abhishek Kumar Misra ..... <i>A. K. Misra</i>
	6. Dr. Kusumanjali Deshmukh..... <i>K. Deshmukh</i> <i>26/07/22</i>

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

SYLLABUS FOR (2023-24)

M.Sc. (Physics) Semester- III

Paper – VI

MPHL06: LAB-COURSE II- ELECTRONICS

Min. Marks: 34

Max. Marks: 100

Scheme of Marks:

Max. Marks: 100 marks

Expt : 60 marks

Sessional: 20 marks

Viva: 20 marks

List of Experiments

1. Four-bit adder & subtractor.
2. Up-down counter using 74193.
3. 4-bit ripple counter.
4. Binary counter using 7490.
5. Half adder & full adder.
6. De Morgan's theorems.
7. Modulation & Demodulation.
8. Study of Active filters
9. Study of seven segment display.
10. Digital to Analog conversion.
11. Study of Multi vibrators.
12. Construction of an IC amplifier.
13. Negative feedback amplifier.
14. Applications of 741 & 741 d

Name and Signatures

Name and Signatures	
V.C. Nominee .....	Departmental members
Subject Expert ..... <i>Monika</i> <i>26/07/2022</i>	1. H.O.D Dr. Jagjeet Kaur Saluja ..... <i>Jagjeet</i> <i>26/07/22</i>
Subject Expert.....	2. Dr. R. S. Singh ..... <i>R.S.S.</i>
Alumni (member).....	3. Dr. Anita Shukla ..... <i>Anita</i>
Prof. from other Dept. of Sc. Faculty ..... <i>R.S.</i> <i>26/07/22</i>	4 Mrs. Sitieshwari Chandrakar ..... <i>Sitieshwari</i> <i>26/07/22</i>
Specialist from Industry..... <i>Dr. Singh</i> <i>26/07/22</i>	5. Dr. Abhishek Kumar Misra ..... <i>Abhishek</i>
	6. Dr. Kusumanjali Deshmukh..... <i>Kusumanjali</i> <i>26/07/22</i>