DEPARTMENT OF PHYSICS
GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
Approved syllabus for M.Sc.(PHYSICS) by the members of Board of Studies for the Session 2021-22
The syllabus with the paper combinations is as under

Semester III:

Paper I: CONDENSED MATTER PHYSICS	**Paper II: NUCLEAR & PARTICLE PHYSICS**
Paper III: Special Paper-I (ELECTRONICS)	**Paper IV: Special Paper-II (ELECTRONICS)**
Paper V: Lab Course A(GENERAL)	

* Applicable for the concerned subjects
The syllabus for M.Sc. (PHYSICS) is hereby approved for the session 2021-22 .

Name and Signatures

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

Syllabus and Marking Scheme for Third Semester
Session 2021-22

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment	
		Max	Min	Max.	Min.
I	CONDENSED MATTER PHYSICS	80	16	20	04
II	NUCLEAR & PARTICLE PHYSICS	80	16	20	04
III	Special Paper-I (ELECTRONICS)	80	16	20	04
IV	Special Paper-II (ELECTRONICS)	80	16	20	04
V	Lab Course I A(GENERAL)	200	66		
	Total	520		80	

04 Theory papers	-	320	
04 Internal Assessments	-	80	
Practical	-	200	
Total Marks	-	600	

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The scheme of internal assessment
Session 2021-22
Semester III

S.No.	Paper	Test Marks I	Home Assignment II	Total
1.	**CONDENSED MATTER PHYSICS**	**20 Marks**	**20 Marks**	**(20 Marks)**
2.	**NUCLEAR & PARTICLE PHYSICS**	**20 Marks**	**20 Marks**	**Average of I & II 20 Marks**
3.	**Special Paper-I (ELECTRONICS)**	**Only one seminar (20 marks) 1Presentation -- (10 marks)** **2.Viva - (10 marks) - (10 marks)**		**(20 Marks)**
4.	**Special Paper-II (ELECTRONICS)**	**20 Marks**	**20 Marks**	**Average of I & II (20 Marks)**

Note: Compulsory submits one hardcopy and softcopy of ppt before presentation.

.

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GOVT. V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)
SYLLABUS FOR (2021-22)
Semester-III
Paper-I-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 defermation 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 $T^{3/2}$ 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.

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Question Paper Format and Distribution of Marks for PG Semester Examination

Question paper format for the Post-Graduate Examination has been revised from the Session 2018-19. The revised format will be applicable for all the question papers of Semester I, II, III & IV. The following are the main points of the new format:

1. The question paper will be of **80 marks** (as before)
2. Questions will be asked Unit-wise in each question paper.
3. 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. Some papers of English Literature consist of Literary Text. In such question papers, one annotation of 4 marks from each unit will be asked instead of short answer type question. The papers which do not contain literary texts the question paper format and marking scheme will remain the same.
5. For Hindi Literature, refer the Hindi version.
6. Internal Assessment Examination will be as follows :
   i. Internal Test in each paper (20 marks)
   ii. Seminar (Power point presentation) in any one of the paper (20 marks)

iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)

iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

स्नातकोत्तर सेमेस्टर परीक्षा के लिए प्रश्नपत्र का प्रारूप एवं अंक विभाजन

सत्र 2018–19 से स्वशासी स्नातकोत्तर परीक्षाओं के लिए प्रश्नपत्र के प्रारूप में संशोधन किया गया है। संशोधित प्रारूप प्रथम, द्वितीय, तृतीय एवं चतुर्थ सेमेस्टर के सभी प्रश्नपत्रों के लिए लागू होगा। नए प्रारूप के मुख्य बिंदु निम्नानुसार हैं –

  i. प्रश्नपत्र पूर्ववत 80 अंकों का होगा।

  ii. प्रत्येक प्रश्नपत्र में इकाईवार प्रश्न पूछे जाएँ।

  iii. प्रत्येक इकाई से निम्नानुसार प्रश्न होने चाहिए –

प्रश्न 1. अति लघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर)   02 अंक

प्रश्न 2. अति लघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर)   02 अंक

प्रश्न 3. लघूत्तरी प्रश्न (200 से 250 शब्दों में उत्तर)   04 अंक

प्रश्न 4. दीर्घ उत्तरी प्रश्न (400 से 450 शब्दों में उत्तर)   12 अंक

	इकाई–I	इकाई–II	इकाई–III	इकाई–IV
अतिलघूत्तरी (2 प्रश्न) अधिकतम 2 वाक्य	2 x 2 = 4 अंक	2 x 2 = 4 अंक	2 x 2 = 4 अंक	2 x 2 = 4 अंक
लघूत्तरी (1 प्रश्न) 200–250 शब्द	1 x 4 = 4 अंक	1 x 4 = 4 अंक	1 x 4 = 4 अंक	1 x 4 = 4 अंक
दीर्घ उत्तरी (1 प्रश्न) 400–450 शब्द	1 x 12 = 12 अंक	1 x 12 = 12 अंक	1 x 12 = 12 अंक	1 x 12 = 12 अंक

नोट :

1. प्रश्न क्रमांक 1 तथा प्रश्न क्रमांक 2 के प्रश्न अनिवार्य होंगे।

2. प्रश्न क्रमांक 3 तथा प्रश्न क्रमांक 4 के अंतर्गत दो वैकल्पिक प्रश्न होंगे जिनमें से एक को हल करना होगा।

3. उपरोक्तानुसार प्रत्येक इकाई से दो अनिवार्य अति लघूत्तरी प्रश्न (2+2 अंक), एक आंतरिक विकल्पयुक्त लघूत्तरी प्रश्न (4 अंक) तथा एक आंतरिक विकल्प युक्त दीर्घ उत्तरी प्रश्न (12 अंक) पूछे जाएँगे। इस तरह प्रत्येक इकाई से 20 अंक तथा पाठ्यक्रम की चार इकाईयों से कुल 80 अंक के प्रश्न होंगे।

4. अंग्रेजी साहित्य के कुछ प्रश्नपत्रों में साहित्यिक पाठ (Literary texts) सम्मिलित हैं। इन प्रश्नपत्रों में लघूत्तरी प्रश्न के रूप में 04 अंकों का एक व्याख्यापरक प्रश्न (annotation) प्रत्येक इकाई से पूछा जाएगा। जिन प्रश्नपत्रों में साहित्यिक रचनाओं का पाठ शामिल नहीं है, उनके लिये प्रश्नपत्र प्रारूप तथा अंक विभाजन यथावत रहेगा।

5. हिंदी साहित्य के जिन प्रश्नपत्रों की पाठ्यवस्तु में साहित्यिक कृतियों के पाठ सम्मिलित हैं, उनमें भी लघूत्तरी प्रश्न के स्थान पर प्रत्येक इकाई से एक व्याख्यात्मक प्रश्न होगा, किन्तु अंक विभाजन निम्नानुसार होगा –

प्रश्न 1.   अति लघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर)   2 अंक

प्रश्न 2.   अति लघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर)   2 अंक

प्रश्न 3.   व्याख्यात्मक प्रश्न (200 से 250 शब्दों में उत्तर)   6 अंक

प्रश्न 4.   आलोचनात्मक प्रश्न (400 से 450 शब्दों में उत्तर)   10 अंक

6. आंतरिक मूल्यांकन परीक्षा यथावत निम्नानुसार होगी –

  i. प्रत्येक प्रश्न पत्र में आंतरिक जाँच परीक्षा (20 अंक)

  ii. किसी एक प्रश्न पत्र में सेमीनार के अंतर्गत पावर पाइण्ट प्रस्तुति (20 अंक)

  iii. सेमीनार वाले प्रश्नपत्र को छोड़कर शेष सभी प्रश्नपत्रों में से प्रत्येक में सत्रीय कार्य (20 अंक)

  iv. किसी एक प्रश्न पत्र में आंतरिक जाँच परीक्षा + सेमीनार तथा शेष प्रश्न पत्रों में आंतरिक जाँच परीक्षा + सत्रीय कार्य के लिये परीक्षार्थी के प्राप्तांकों के औसत की गणना कर उसे मान्य किया जाएगा।

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)
SYLLABUS FOR (2021-22)
M.Sc. (Physics)
Semester-III
Paper-II-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 Beta decay Fermi theory of beta decay. Shape of the beta spectrum total decay rate, angular momentum and parity selection rules. Transitions, Selection rules, Parity violation, Two component theory of neutrino decay. Gamma decay-multipole transitions in nuclei. Angular momentum and parity selections rules, Internal conversion, nuclear isomerism.

UNIT-IV   **Elementary Particle Physics** – Types of interactions between elementary particles Hadrons and Leptons. Symmetry and conservation laws, Elementary idea of CPT invariance. Classification of hadrons, SU(3) multiples, Quark model Gell-Mann Okubo mass Formula, Flavours, Colours and quarks.

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REFERENCES :
1. Introduction to Nuclear Physics : H.A. Enge
2. Introduction to Elementary Physics : Griffith
3. Atomic and Nuclear Physics : Ghoshal
4. Elements of Nuclear Physics : Pandya & Yadav
5. Nuclear Physics : Tayal

Question Paper Format and Distribution of Marks for PG Semester Examination

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      1. The question paper will be of **80 marks** (as before)
2. Questions will be asked Unit-wise in each question paper.
3. 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. Some papers of English Literature consist of Literary Text. In such question papers, one annotation of 4 marks from each unit will be asked instead of short answer type question. The papers which do not contain literary texts the question paper format and marking scheme will remain the same.
5. For Hindi Literature, refer the Hindi version.
6. Internal Assessment Examination will be as follows :
    i. Internal Test in each paper (20 marks)

ii. Seminar (Power point presentation) in any one of the paper (20 marks)

iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)

iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

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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.

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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:

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

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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. Some papers of English Literature consist of Literary Text. In such question papers, one annotation of 4 marks from each unit will be asked instead of short answer type question. The papers which do not contain literary texts the question paper format and marking scheme will remain the same.
5. For Hindi Literature, refer the Hindi version.
6. Internal Assessment Examination will be as follows :
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   ii. Seminar (Power point presentation) in any one of the paper (20 marks)
   iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)

iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

	Departmental members
V.C. Nominee …………………………………..	**1. H.O.D/Dr. Purna Bose……………………**
Subject Expert …………………………………………..	**2. Dr. Jagjeet Kaur Saluja……………..**
Subject Expert…………………………………………	**3. Dr.R.S.Singh………………………..**
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GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)

SYLLABUS FOR (2021-2022)
M.Sc. (Physics)
Semester-III
Paper-IV-Special Paper-II (ELECTRONICS)   M.M.:80

Min.Marks: 16   **Max..Marks.:80**

UNIT-I   **Combinational Logic**: Half and full adders, half and full substractors, 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 & reflux 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.

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Text and reference books

- Handbook of Electronics by Kumar & Gupta
- Fundamental; of Digital Circuit by A. Anand Kumar
- Digital Electronics by R.P. Jain
- Microwave devices and circuits by Samuel Y. liao
- Microwave & Radar Engineering by M. Kulkarni
- Satellite Communication by D.C. Agrawal

Text and reference books

- Semiconductor devices phy. & Tech.by S.M.Sze.
- Introduction to semiconductor device by M.S.Tyagerajan
- Microwave devices and circuits by Samuel Y. liao
- Microwave & Radar Engineering by M. Kulkarni
- Handbook of Electronics by Kumar & Gupta

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  (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.
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GOVT.V.Y.T. P. G. AUTONOMOUS COLLEGE, DURG (C.G.)
SYLLABUS FOR (2021-2022)
M.Sc. (Physics)
Semester-III
LAB COURSE A (GENERAL)

Scheme of Marks:
Max. Marks: 200 marks
Expt : 140 marks
Sessional: 20 marks
Viva: 40 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 Stefen's constant.
7. Study of Hall Effect.
8. Study of bending loses 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 & Hystersis loss.
15. Study of thermo-luminescence.
16. Determination of the number of countes at various distences between the radio active Source & the tube
17. Determination of the effect of various obstical 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.

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   Q.3 Short answer type question **(Answer in 200-250 words)**   **(04 Marks)**
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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:

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DEPARTMENT OF PHYSICS
GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
Approved syllabus for M.Sc.(PHYSICS)by the members of Board of Studies for the Session (2021-2022)
The syllabus with the paper combinations is as under

Semester IV:

Paper I: LASER PHYSICS & APPLICATION OF LASER	Paper II: Computational Methods & Programming
Paper III: Special Paper- III ELECTRONICS	Paper IV: Special Paper- IV ELECTRONICS
Paper V: Lab Course B(ELECTRONICS)	

 * Applicable for the concerned subjects
The syllabus for M.Sc.(PHYSICS)is hereby approved for the session 2021-22 .
Name and Signatures

	Departmental members
V.C. Nominee …………………………………..	1. H.O.D/Dr. Purna Bose……………………
Subject Expert …………………………………..	2. Dr. Jagjeet Kaur Saluja……………..
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Syllabus and Marking Scheme for Fourth Semester
Session 2021-22

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment	
		Max	Min	Max.	Min.
I	LASER PHYSICS & APPLICATION OF LASER	80	16	20	04
II	Computational Methods & Programming	80	16	20	04
III	Special Paper- III ELECTRONICS	80	16	20	04
IV	Paper-IV ELECTRONICS	80	16	20	04
V	Lab Course I A(GENERAL)	200	66		
	Total	520		80	

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04 Theory papers          -        320
04 Internal Assessments   -         80
 Practical                -        100
Project                   -        100
Total Marks               -        600
```

Departmental members	

V.C. Nominee …………………………………..

Departmental members

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The scheme of internal assessment
Session 2021-22
Semester IV

S.No.	Paper	Test Marks I	Home Assignment II	Total
1.	**LASER PHYSICS & APPLICATION OF LASER**	**Only one seminar (20 marks)** (i) (10 marks) **(ii) Viva (10 marks)**	Presentation	**Average of I & II (20 Marks)**
2.	**Computational Methods & Programming**	**20 Marks**	**20 Marks**	**Average of I & II (20 Marks)**
3.	**Special Paper- III ELECTRONICS**	**20 Marks**	**20 Marks**	**Average of I & II (20 Marks)**
4.	**Paper-IV ELECTRONICS**	**20 Marks**	**20 Marks**	**20 Marks**

Note: Compulsory submits one hardcopy and softcopy of ppt before presentation.
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GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)
SYLLABUS FOR 2021-2022
M.Sc. (Physics)
Semester-IV
Paper- I- LASER PHYSICS & APPLICATION OF LASER

Min.Marks: 16   **Max..Marks.:80**

UNIT-I

a) Laser Characteristics: Directionality, Intensity, Monochromatic Coherence, Kinetics of optical absorption, line-broadening mechanisms. Population inversion, Laser pumping.

b) Resonators, Vibrational modes of resonators, Number of modes per unit volume, Quality factor Q, Loses inside the cavity, the threshold conditions.

c) Modes of rectangular cavity, Mode selection, Q-switching, mode locking in lasers, General spherical resonator, higher order modes, Hole Burning.

UNIT-II   Laser System:

a) Ruby Laser: A three level system, pumping power, spiking.

b) Neodymium Lasers: Nd-YAG Laser, Nd-Glass Laser.

c) Semiconductor Lasers: Central features, Intrinsic, doped and injection Laser, application.

d) Gas Laser: Nitrogen (Vibronic) Lasers, Carbon dioxide laser excimer laser.

UNIT-III

a) Laser spectroscopic Techniques: Raman Scattering, Stimulated Raman effect, Hyper Raman Effect, Photo-acoustic Raman spectroscopy(PARS)

b) Nonlinear interaction of light with matter: Harmonic generation, Phase matching optical mixing, parametric generation of light, self-focusing.

c) Multiphoton processes & applications: Multiquantum photoelectric effect, theory of two photon processes, Doppler free two photon spectroscopy, multiphotons processes, phase conjugate optics (elementary) parametric light oscillators.

UNIT-IV

Applications of Lasers:

Optical Fibre communication: optical fibres numerical aperture, pulse   dispersion in step index fibers, modal analysis for a step index fiber, pulse dispersion, multimode fibers, first and second generation fiber optic communication, single mode fiber Gaussian approximation, splice loss, vector modes optical fibre communications laser ranging, A brief description of Laser applications in industry, medicine, astronomy and biology. Application of laser in Isotope separation.

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REFERENCES -

1.   B.B.Laud -Laser and nonlinear optics.
2.   Ghatak & Tyagrajan – Laser and its application.

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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**

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GOVT. V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)
SYLLABUS FOR 2021-2022
M.Sc. (Physics)
Semester – IV
Paper –II Computational Methods & Programming

Min.Marks: 16   **Max..Marks.:80**

Note: - From unit-1 to unit-3 no programming is required.

Unit-1   Solution of algebraic and transcendental equation Newton-Raphson method, bisection method, Regula – Falsi method, Iteration method, rate of convergence of Newton's method when there exist double roots gauss iterative method. Method of Solution using the inverse of the matrix, jacobies method eigen value and eigen vector matrices.

Unit-2   **Finite difference and Interpolation:** (1) Finite difference forward difference, back ward difference, central difference. (2) Difference of polynomial. (3) Factorial notation, Newton's Interpolation formulae, central difference interpolation formulae. Choice of an interpolation formulae interpolation with unequal intervals.

                 Curve fitting: Graphical method, principle of least Square, method of least squares and cubic spline Error's in the cubic spline derivatives.

Unit-3   **Numerical solution of ordinary differential equation** : Picard'd method, Taylor series method Euler's method . Modified Euler's method .**Runge's Method**: Runge kutta method.

                 Predictor corrector method : Milne's method, adam's bashforth method.

                 Solution of partial differential equation: function of two or more variables (ii) partial derivates.

Unit-4   **Fortran programming:** Flow charts: input output statements, conditional statements implementing loops in programmes, logical expression and more control statement Airthmetic expression: airthmetic operators integer expression, Real expression, precedence at operation in expression Assingment statement executable and non executable statement.

. **REFERENCES:-**
   1.Sastry (Introduction method of numerical Analysis)
   2.Rajaraman Numerical Analysis
   3.C by Yshwant kanitwar
   4.C programming by Dennis Riche and Brain Karnighan
  5.   C programming by Schauam series.
  6.   Gupta & Malik (calculus of Finit Difference)& Numerical Analysis

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   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:

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SYLLABUS FOR (2021-2022)
M.Sc. (Physics)
Semester-IV
Special Paper- III ELECTRONICS

Min.Marks: 16   **Max..Marks.:80**

UNIT-I   **Amplitude modulation:** frequency spectrum of AM, average power, average voltage, modulation index for multiple sign waves modulator, balance modulator, signal side band SSB, generation/method, SSB detection, Transmitter and receivers: Super heterodyne receiver, AM Transmitters.

UNIT-II   **Angle modulation:** Mathematical representation of of FM and PM signal, inter system comparison (FM & AM); generation of FM direct & indirect method. Phase Modulation.

UNIT-III   **Digital Communication:** Pulse modulation system. Sampling theorem, low pass and band pass signals. Pulse-Amplitude modulation, Channel Band width for a PAM signal, Natural sampling, signal recovery through holding, Differential PCM, Delta modulation.
   Digital techniques: ASK, PSK and FSK**,** DPSK QPSK, generation and detection.

UNIT-IV   **Computer communication system:** LAN, WAN and MAN, Wireless network,   Network topology, OSI and TCP/IP reference model, comparison between them and their criticism, basic idea about ISDN. Time Division Multiple Access (TDMA) Frequency Division Multiple Access (FDMA), ALOHA.

REFERENCES:
   1.   Principle of communication system Taub & Schilling
   2.   Communication system-Simon Haykin.
   3.   Communication system- R.P.Singh & S.D.Sapre.
   4.   Data Communication and Networking Behrouz A. Forouzan

Name and Signatures

	Departmental members
V.C. Nominee ………………………………..	1. H.O.D/Dr. Purna Bose……………………
Subject Expert ………………………………………..	2. Dr. Jagjeet Kaur Saluja……………..
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Question Paper Format and Distribution of Marks for PG Semester Examination

Question paper format for the Post-Graduate Examination has been revised from the Session 2018-19. The revised format will be applicable for all the question papers of Semester I, II, III & IV. The following are the main points of the new format:

    1. The question paper will be of **80 marks** (as before)
2. Questions will be asked Unit-wise in each question paper.
3. 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.   Some papers of English Literature consist of Literary Text. In such question papers, one annotation of 4 marks from each unit will be asked instead of short answer type question. The papers which do not contain literary texts the question paper format and marking scheme will remain the same.
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    6.   Internal Assessment Examination will be as follows :
        i.   Internal Test in each paper (20 marks)
      ii. Seminar (Power point presentation) in any one of the paper (20 marks)
     iii. Assignment in each of the remaining papers (excluding the paper of Seminar.   (20 marks)
     iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

GOVT.V.Y.T. P.G. AUTONOMOUS COLLEGE, DURG (C.G.)
SYLLABUS FOR (2021-2022)
M.Sc. (Physics)
Semester-IV
Paper-IV ELECTRONICS

Min. Marks: 16   **Max..Marks.:80**

UNIT- I   Architecture of 8086:

Difference between 8085 and 8086, overview of8086 Microprocessor Family, Architecture and Pin configuration of 8086.

System Bus structure Basic 8086/ 8088 system bus architecture, Minimum mode configuration , maximum mode configuration. Internal Microprocessor (8088 and above) architecture.

UNIT-II   ADVANCE MICROPROCESSORS
      (i)   Real mode   and protected mode addressing.
      (ii)   Data addressing, program memory addressing.
      (iii)   Data movement Instructions MOV; push/pop.
      (iv)   Arithmetic and logic instruction (Addition subtraction, multiplication). Basic logic instruction.
      (v)   Program Control Instructions; Jump Group Controlling, the flow of assembly language program.

UNIT-III   MEMORY INTERFACE:
      (i)   Memory Devices.
      (ii)   Address decoding
      (iii)   8088,8086 (8bit) (16bit) memory Interface
      (iv)   Basic idea about 32 bit and 64 bit memory interface (optional reading)
      (v)   Dynamic Ram.

UNIT-IV   BASIC I/O INTERFACE:
      (i)   Introduction to I/O interface;
      (ii)   Basic descriptive idea of Peripheral interface like 8255, 8279(key board display) 8255(Functional description only)
      (iii)   Analog to Digital and Digital to Analog Converter.
      (iv)   Interrupts (Optional Reading Only) . Basic interrupt processing(purpose, type, and interrupt instruction only)

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REFERENCES:

1. Microprocessor – By B. Ram
2. Microprocessor - By Vibhute
3. The Internal Microprocessor Architecture (8086- up to Pentium
   IV-By Barry R. Bray.
4. Advanced Microprocessors and Peripherals- by K.M. Bhurchandi and A. K. Ray.

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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:

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LAB COURSE B: ELECTRONICS

Scheme of Marks:
Max. Marks: 100 marks
Expt : 60 marks
Sessional: 20 marks
Viva: 20 marks
Project work & Viva: 100 marks

Students who want to do project work from college/Institute other than from our college can perform their project work under the supervison of Regular Professor/ Assistant Professor in that college/ Institute.

List of Experiments

1. Four-bit adder & subtractor.
2. Up-down carrier using 74193.
3. 4-bit ripple counter.
4. Binary counter using 7490.
5. Half adder & full adder.
6. De Morgan's theorems.
7. Microprocessor (Addition, Subtraction, Multiplication, Division.)
8. Modulation & Demodulation.
9. Study of Active filters
10. Study of seven segment display.
11. Digital to Analog conversion.
12. Study of Multi vibrators.
13. Construction of an IC amplifier.
14. Negative feed back amplifier.
15. Applications of 741 & 74l d

Or any other experiments of equal standard

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   iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately

2. The candidate has to secure minimum 36% marks as an aggregate in order to pass the semester examination.

3. The internal assessment shall include class test home assignment and seminar presentation.

4. a. In internal assessment, the marks taken into consideration will be the average of the two tests (i.e. the class test and the home assignment) for each paper and shall be of 20 marks each.

 b. The seminar shall be in lieu of class test and home assignment combined and shall be of 20 marks.

 c. There shall be one seminar in each semester. Paper I is completely dedicated to seminar in I semester, similarly Paper II to second semester, Paper III to third semester and Paper IV to fourth semester respectively for the purpose of Internal Assessment. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

5. The grading system was implemented from 2015-16 onwards for the for the students admitted in at the first semester of all PG subjects.

<u>Value Added Course in Physics</u>

1. Remote Sensing

Introduction, Definition, History, Principal of RS, Physics behind RS, Types of RS, Elements of RS, EMR behind RS, GPS importance in RS technology, Applications of RS. Types of Remote Sensing, Satellites & Sensors.

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