ABOUT UNIVERSITY

Dr. C.V. Raman University was established on 3 November, 2006, in the district of Bilaspur, Chhattisgarh by the "All India Society for Electronics and Computer Technology" (AISECT), the Sponsoring Body. The University was named after the first Nobel Laureate of the country in the field of science – Dr. C.V. Raman, an Indian physicist efforts influenced in the growth of science in our country. The University's principle goal is to evolve a new cadre of highly skilled technical professionals with deep academic insights and a strong sense of Indian 'Values and ethics', commemorating our forefathers who helped shape this nation.

The Sponsoring Body of the University-All India Society for Electronics and Computer Technology (AISECT) is an ISO 9001:2008 certified organization, established in 1985 and is today's one of The India's most reputed and trusted Education Groups which houses private Universities, Engineering Colleges, Professional Institutions & Education Centres across the country. Till date, AISECT has transformed the lives of over 19 lakh students and has uplifted the lives of millions of people in the community. AISECT has been lauded for its exceptional work and has won awards from the World Bank, NASSCOM, TiE, Government of India, Government of Madhya Pradesh and several others on account of its commitment to high quality education over the last 28 years. AISECT is also a partner institution with GoI, GoMP and GoCG in their Common Service Centre Program and several other projects of state and national concern.

MAIN OBJECTIVES

- Provide quality higher education and make provisions for research
- Create higher levels of intellectual abilities among our students
- Establish state-of-the-art facilities for education, training and examination, including online training
- Carry out teaching, research and offer comprehensive learning for a bright professional career
- Create centers of excellence for R&D to promote an environment of innovation and research
- Provide consultancy to public organizations and the Industry
- Award and maintain the standard of degrees, diplomas, certificates and other academic distinctions in accordance with the norms laid down by UGC, AICTE, BCI, MCI and other regulatory bodies.

RECOGNITIONS

- The University is recognized under Section 2(f) of the UGC Act.
- Joint Committee Approval of DEB(UGC/AICTE/DEB)

- Other recognitions include AICTE, NCTE, BCI and DEB
- It is the first University in the state of Chhattisgarh to be awarded an ISO: 9001-2008 Certification.
- Membership of the Association of Indian Universities (AIU)
- NACC B+

THE FACULTIES OF STUDIES

The University has wide range of faculties which offers the traditional as well as the new era job oriented courses. The main emphasis is on providing a wide choice of courses at different levels. The following faculties currently are in operation in the University:

- Faculty of Arts
- Faculty of Commerce
- Faculty of Management
- Faculty of Science
- Faculty of Engineering
- Faculty of Information Technology
- Faculty of Education
- Faculty of Law

ABOUT INSTITUTE OF OPEN AND DISTANCE EDUCATION (IODE), CVRU

Education determines the quality of our life to a great measure, especially professional life. However, for many, in some circumstances, the path to education is ridden with many obstacles, including location, geographical inflexibility and lack of time. Fortunately, distance education is changing that scenario by providing an effective alternative platform to learn new skills and acquire a degree, such as distance education MBA, without having to attend traditional classes.

We, a UGC/DEB approved distance university (1 may 2009), offer various undergraduate and post-graduate degrees, along with a number of diplomas, which have benefitted many distance learners.

Our distance learning programmes are the shining light that many have been looking for; they unite conventional teaching approaches, including course materials in the form of books, and modern teaching methodologies, which include online access to the course. Our unique approach has made us the centre of distance education in Chhattisgarh, helping scores of professionals to obtain a degree and fly high in their careers.

With our distance learning programmes, we are bringing people into the fold of skilled workforce, which has changed the life of many.

What makes us a distinguished Chhattisgarh distance education university?

- Reaching various far-flung regions of the state through information technology
- Providing professional education, need- and knowledge-based

- Setting new national standards in distance education

IMPORTANT ACHIEVEMENTS

- AN ISO 9001: 2008 Certified University
- NIRF Ranking Under Top 200 University
- World Education Award
- Largest Network for Learning Support System.
- Declaration of Term end result Time to Time.
- Best in Skill Development Award 2015
- Best University in Open Distance and online Award 2017

ACADEMIC PROGRAMMES OFFERED BY THE UNIVERSITY IN OPEN AND DISTANCE LEARNING MODE

The University offers through the Institute of Open and Distance Education (IODE) both short term and long term programmes leading to Certificates, Diploma and Degrees, which are conventional as well as innovative. Most of these programmes have been developed after an initial survey of the demand for such Programmes in the job market. They are launched with a view to fulfil the learner's need for skill and employability.

- Certification,
- Improvement of skills,
- Acquisition of professional qualifications,
- Continuing education and professional development at work place,
- Self-enrichment,
- Diversification and updation of knowledge, and
- Empowerment.

PROMINENT FEATURES OF THE OPEN AND DISTANCE EDUCATION AT CVRU

The open and distance education at the Dr. C. V. Raman University has certain unique features such as

- Individual study - flexible in terms of place, pace and duration of study.
- Use of latest information and communication technologies.

- Modular approach to programmes.
- Cost-effective programmes.
- Socially and academically relevant programmes based on students need
- Convergence of open and conventional education systems.
- Take higher-education to the unreached sections of the society through the use of information technology.
- Provide need and knowledge-based professional education.
- Set the national standards for Distance Education.

PROGRAMME DELIVERY MODE

The methodology of instruction in the distance learning mode in the university is different from that of the conventional regular programs. The system adopted for this more learner oriented and the learner is an active participant in the pedagogical process. Most of the instructions are imparted through distance education methodology and face to face mode as per requirement. The programme delivery methodology used in the distance learning mode follows a multimedia approach for instructions, which compromises:

- **Self Instructional Written Material:** The printed study material (written in self instructional style) for both theory and practical components of the programs is supplied to the learners in batches for every course.

- **Audio-Visual Material Aids:** The learning package contains audio and video CDs which have been produced/adopted by the University for Better Clarification and enhancement for understanding of the course material given to the learners. A video programme is normally of 25-30 minutes duration. The video cassettes are screened at the leaner support centre during specific sessions which are duly notified for the benefit of the learners.
- **Counseling Sessions:** Normally counseling sessions are held as per schedule drawn by the IODE DR. C. V. RAMAN UNIVERSITY. These are mostly held outside the regular working hours of the learner support centre.
- **Teleconferences:** Live teleconferencing sessions are conducted via Internet/ satellite through interactive Video Conferencing facility (available at some places) from the University studios, the schedule of which is made available at the learner support centre.

- **Industrial Training/Practical/Project work:** Some programmes have industrial training/practical/ project component also. Practical are held at designated institutions for which schedule is provided by the learner support centre. Attendance at practical is compulsory. For Project Work, comprehensive project guide, in the form of booklet, is provided to the student along with the study material.

- The printed study materials will be dispatched periodically to the enrolled students for each paper of study. These materials will be as guide for the students for effective

learning. The assignment for internal assessment shall also be dispatched along with the study material. Online modules are also available for some courses. These are in progress and as and when available, these will be available on the website of the students for registered candidates.

- The counseling sessions will be of 30 days duration for a course in a year. The actual schedule and place of contact program shall be announced and communicated to students in – time.

EVALUTION SYSTEM

The system of evaluation in open and distance learning system has a multi-tier system of evaluation.

1. Self-assessment exercise within each unit of study.
2. Continuous evaluation mainly through assignments which are tutor-marked practical assignments and seminar/workshop/extended.
3. The term-end examinations.
4. Project work.

The evaluation of learners depends upon various instructional activities undertaken by them. A learner has to write assignment responses compulsorily before taking term-end examination from time to time to complete an academic programme. A learner has to submit TMA responses to the learner support centre established by IODE Dr. C. V. Raman University. A learner should keep duplicate copies of assignments responses of TMA that may be required to be produced at Student Evaluation Division on demand. Term-end examination will be conducted at various examination centre approved by institute of open and distance education Dr. C. V. Raman university spread all over the Chhattisgarh. The weightage for Term End Examination will be 70% and weightage for Internal Assessment will be 30 % for this programme.

TERM-END EXAMINATION AND PAYMENT OF EXAMINATION FEE

The University conducts Term-end Examination in semester system and held in the month of Nov/Dec and May/June every year. Students will be permitted to appear in term-end examination subject to the conditions that:

1. Registration for the courses, in which they appeared is valid,
2. Minimum Time to pursue these courses is elapsed.
3. Submission of required number of assignment in respective courses by the due date.

Students can also submit on-line examination form as per guidelines through website at www.cvru.ac.in. Examination fee is required to be paid online payment gateway as per the fee table. Please do all correspondence regarding the course admission and other detail at the following address:

The Director
Institute of Open and Distance Education (IODE)
Dr. C. V. Raman University
Kargi Road, Kota, Bilaspur, Chhattisgarh
Phone: 07753253851, 8827920016, 8827920019
Email: cvrussd@gmail.com

LEARNER SUPPORT DESK

Phone: 07753253872, 07753-253873, 8359050061
Email: cvrussd@gmail.com

PROGRAMME GUIDE

DISTANCE EDUCATION PROGRAMMES

MASTER OF SCIENCE (M. Sc.) - PHYSICS

- **Scheme of Examination**
- **Detailed Syllabus, Practical & Reference Book**
- **Counseling and Study Structure**
- **Study Modules & Books Information**
- **Date Schedule & Instructions for Submitting Assignments**
- **Guideline For Preparation of Project Report**

DR. C.V. RAMAN UNIVERSITY
INSTITUTE OF OPEN AND DISTANCE EDUCATION (IODE)
KARGI ROAD, KOTA, BILASPUR, CHATTISGARH
PHONE : 07753-253851, 8827920016, 8827920019 FAX : 07753-253728
E-mail: cvrussd@gmail.com, Website: www.cvru.ac.in

MASTER OF SCIENCE (M.SC.) – PHYSICS

Duration : 24 Months (2 Years) **Eligibility : Graduation with Maths Subjects**

SCHEME OF EXAMINATION

Course Code	Name of the Course	Credit	Total Marks	Theory		Practical Marks		Assignments / Viva	
				Max	Min	Max	Min	Max	Min
FIRST SEMESTER									
1MSCP1	Mathematical Physics	3	100	70	25	-	-	30	11
1MSCP2	Classical Mechanics	3	100	70	25	-	-	30	11
1MSCP3	Quantum Mechanics I	3	100	70	25	-	-	30	11
1MSCP4	Electronic Devices	3	100	70	25	-	-	30	11
1MSCP5	Lab Electronics	2	100	-	-	70	25	30	11
1MSCP6	Lab Fiber Otics	2	100	-		70	25	30	11
	Total	**16**	**600**	**280**	**112**	**140**	**56**	**180**	**72**
SECOND SEMESTER									
2MSCP1	Quantum Mechanics II	3	100	70	25	-	-	30	11
2MSCP2	Statistical Mechanics	3	100	70	25	-	-	30	11
2MSCP3	Solid State Physics	3	100	70	25	-	-	30	11
2MSCP4	Atomic & Molecular Physics	3	100	70	25	-	-	30	11
2MSCP5	Lab-SSP & AE	2	100	-	-	70	25	30	11
2MSCP6	Lab-Laser & Spectroscopy	2	100	-		70	25	30	11
Total		**16**	**600**	**280**	**112**	**140**	**56**	**180**	**72**
THIRD SEMESTER									
3MSCP1	Condensed Matter Physics	3	100	70	25	-	-	30	11
3MSCP2	Nuclear & Particle Physics	3	100	70	25	-	-	30	11
3MSCP3	Electrodynamics	3	100	70	25	-	-	30	11
3MSCP4	Digital Electronics & Microprocessor	3	100	70	25	-	-	30	11
3MSCP5	Lab-DE & Communication	2	100	-	-	70	25	30	11
3MSCP6	Lab-Nuclear Physics & Microprocessor	2	100	-		70	25	30	11
Total		**16**	**600**	**280**	**112**	**140**	**56**	**180**	**72**
FOURTH SEMESTER									
4MSCP1	Computational Methods & Programming	3	100	70	25	-	-	30	11
4MSCP2	Material Science	3	100	70	25	-	-	30	11
4MSCP3	Plasma Physics	3	100	70	25	-	-	30	11
4MSCP4	Elective Paper- Atmospheric science/ Physics of Nano Materials/Environmental Physics/Communication Electronics/Computer Architecture, Networking & assembly Level Programming	3	100	70	25	-	-	30	11
4MSCP5	Project	4	200	-	-	140	50	60	22
Total		**16**	**600**	**280**	**112**	**140**	**56**	**180**	**72**

EVALUATION SCHEME

1. 36% in each theory, practical, project, dissertation & internal assessment but the total aggregate for passing is 40%.
2. Total project marks are 200 in which 140 marks for project report and 60 marks will be for project viva.

Dr. C.V. RAMAN UNIVERSITY

Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- First Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSCP1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- MATHEMATICAL PHYSICS

UNIT-I

Differential equations: Recursion relation, generating functions and orthogonality of Bessel functions of first and second kind, Hermite, Legendre, Associate Legendre and Laguerre Polynomials. Curvilinear co-ordinate system with specific cases of Cartesian, Cylindrical, and Spherical coordinate systems.

UNIT-II

Integral transforms. Fourier integrals, Fourier transforms and inverse Fourier transforms, Fourier transform of derivatives, Convolution theorem, Elementary Laplace transforms. Laplace transform of derivatives, Application toa damped harmonic oscillator.

UNIT-III

Green's functions: Non-homogenous boundary value problems, Green's function for one dimensional problem, Eigen function expansion of Green's function, Fourier transform, Method of constructing Green's function, Green's function for electrostatic boundary value, Problems and quantum- mechanical scattering problem.

UNIT-IV

Complex variables: Analyticity of complex functions, Cauchy Riemann equations, Cauchy theorem, Cauchy integral formula, Taylors, Maclaurin, Laurent series & mapping. Theorem of residues, Simple cases of contour integration, Jordan's lemma Integrals involving multiple valued functions(Branch points).

TEXT AND REFERENCE BOOK

- Mathematics of Engineers and Physicists (L. A. Pipes), Tata McGraw Hill, Edition
- Mathematical Physics (Gupta,Yadav&Mallik),Kedarnath&Ramnath Publication, Meerut
- Mathematical Physics (H. K. Dass)
- Mathematical Physics (Ghatak, Goyal&Guha)
- Complex variable & Laplace Transform (M.R Spiegel- Schaum Series)
- Mathamatical Physics (B.S.Rajput)PragatiPrakashan

Dr. C.V. RAMAN UNIVERSITY

Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- First Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSCP2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- CLASSICAL MECHANICS

UNIT - I

Newtonian mechanics of one and many particles systems: Conservation laws, Constrains their classification, Principle of virtual work; D'Almbert's principle in generalized coordinates, The Lagrange's equation from D'Almbert's principle. Configuration space, Hamilton's principle deduction from D'Almbert's principle, generalized moment and Lagrangian formulation of the conservation theorems, Reduction to the equivalent one body problem; the equation of motion and first integrals, the differential equation for the orbit.

UNIT – II

The equations of canonical transformation and generating functions, The Hamilton-Jacobi Action and Angel variables, Poisson's brackets,Simple algebraic properties of Poisson's brackets, The equation of motion in Poisson's Brackets notation, Poisson theorem,Principle of least action,Kepler's problem, Inverse central force field, Rutherford scattering.

UNI T – III

Theory of small oscillations, Equations of motion, Eigen frequencies and general motion, normal modes and coordinates, Applications to coupled pendulum and linear bi-stable molecule, Rotating coordinate systems,Acceleration in rotating frames,Coriolis force and its terrestrial astronomical applications, Elementary treatment of Eulerian coordinates and transformation matrices,Angular momentum inertia tensor,Euler equations of motion for a rigid body, Torque free motion for a rigid body.

UNIT – IV

Symmetries of space and time, Invariance under Galilean transformation, Covariant fourdimensional formulation, 4 -Vectors and 4 –Scalars, Relativistic generalization of Newton's laws, 4 - momentum and 4 - force, variance under Lorentz transformation relativistic mechanics. Covariant Lagrangian, covariant Hamiltonian, Examples.

TEXT AND REFERENCE BOOK

- Classical Mechanics (H. Goldstein), Addison Wesley
- Classical Mechanics (N. C. Rana& P. S. Jog)
- Classical Mechanics (Landu&Lifshitz- Pergamann Press)
- Classical Mechanics (Sommarfield), Academic Press
- Introduction to Classical Mechanics (R.G.Takwale& P.S. Puranik)
- Classical Mechanics (Gupta, Kumar & Sharma), PragatiPrakashan, Meerut
- Classical Mechanics (SatyaPrakash, Kedar &Ramnath Publication)

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SEMESTER- First Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSCP3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- QUANTUM MECHANICS I

UNIT-I

Basic Postulates of quantum Mechanics, Equation of continuity, Normality, Orthogonality and closure properties of Eigen functions, Expectation values and Ethernets theorems, Solution of Schrodinger equation for one dimensional motion inPotential well, Potential step and Potential barrier.

UNIT-II

Linear vector space, Concept of Hibert space, Bra and Ket notation for state vector, Representation of state vectors and dynamical variables by matrices and unitary transformation (translation and rotation), Creation and annihilation operators, Matrices for x and p. Heisenberg uncertainty relation through operators (Schwartz inequality).

UNIT –III

Solution of Schrodinger equation for linear harmonic oscillator, hydrogen - like atom, square well potential and their respective application to atomic spectra, Molecular spectra and low energy nuclear states (Deuteron).

UNIT – IV

Angular momentum in quantum mechanics, Eigen values and Eigen function of L_2 and Lz in term of spherical harmonics, Commutation relations, Time independent perturbation theory (Degenerate and Non-degeneratecases).

TEXT AND REFERENCE BOOK

- Quantum Mechanics (L. I. Schiff) TMH Ed.
- Introduction Quantum Mechanic(Pauling) TMH Ed
- Quantum Mechanics (B.Craseman and J. D. Powell)Narosa Pub. House Kolkatta
- Quantum Mechanics (AjoyGhatak& S. Loknathan)Mcmillan India Ltd.
- Modern Quantum Mechanics (J. J. Sakurai)
- Quantum Mechanics (Gupta Kumar & Sharma) Jai Prakasdnath and Co.

Dr. C.V. RAMAN UNIVERSITY
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SEMESTER- First Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSCP4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ELECTRONIC DEVICES

UNIT – I

Transistors: JFET, BJT, MOSFET and MESFET, structure derivations of the equations for I-V characteristics under different condition, microwave devices, tunnel diode, transfer electron devices (Gunn diode), avalanche transits time devices, Impatt diodes and parametric devices.

UNIT – II

Photonic devices: radiative and non-radiative transitions, optical absorption, bulk and. Thin film photo conductive devices (LDR), Photo detectors, Solar cell (open circuit voltage and short circuit current, fill factor), LED (high frequency limit, Effect of surface and indirect recombination current, operation of LED), Semi-conductors; Diode lasers (conditions for population inversion in active region, light confinement factor, optical gain and threshold current for lasing.

UNIT – III

Memory Devices: Read Only Memory (ROM) and Random Access Memory(RAM), Types of ROM, PROM, EPROM, EEPROM and EAPROM, Static and dynamic RAMs (SRAM & DRAM), Characteristics of SRAM and DRAM, Hybrid Memories: CMOS and NMOS memories, Non-volatile RAM, Ferroelectric memories, Charge coupled devices (CCD), Storage devices: Geometry and organization of magnetic (FDD & HDD) and Optical (CD-ROM, CD-R, CD-R/W, DVD) Storage devices.

UNIT – IV

Electro-optics, Magneto-optic and Acousto-optic effects, Materials properties related to get theseeffects, Important Ferroelectric, liquid crystal and polymericmaterials forthesedevices,Piezoelectric, Electrostrictive and magnetostrictive effects. Important materialsfortheseproperties and their applications in sensors and actuator devices, Acoustic delay lines, Piezoelectricresonators and filters, High frequency piezoelectric devices-surface, Acoustic wave devices.

TEXT AND REFERENCE BOOK

- Semiconductors devices - physics technology (S.M. Sze) Willey India Pvt. Ltd.
- Hand Book of Electronics(Gupta Kumar)PragatiPrakashan
- Modern Digital Electronics (R.P. Jain) TMH Ed.
- Optical Electronics(AjoyGhatak and Thyagrajam)Mcmillan India Ltd.
- Integrated Electronics (Millman&Halkias) TMH Ed.

Dr. C.V. RAMAN UNIVERSITY

Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- First Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-1MSCP5,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (ELECTRONICS)

1. Study of Regulated power supply.
2. Study of A stable, Mono stable bi stable multivibrators by using IC 555.
3. Study of characteristics and application of SCR.
4. Measurement of Hall Coefficient of given semiconductor: identification of type of semiconductor and estimation of charge carrier concentration.
5. Verification of Booleans expression.
6. Study of Transistor Characteristics in CB mode.
7. Study of Transistor Characteristics in CE mode.
8. Study of Transistor Characteristics in CC mode.
9. Study of FET characteristics.
10. Study of characteristics curve of UJT by using semiconductor device Kit.

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Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- First Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-1MSCP6,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (FIBER-OPTICS)

1. Determination of NA by using optical fibre cable.
2. Setting up fiber optic analog link.
3. Setting up fiber optic digital link.
4. Intensity modulation system using analog input signal.
5. Intensity modulation system using digital input signal.
6. Frequency modulation system.
7. Pulse width modulation system.
8. Study of propagation loss in optical fiber.
9. Study of bending loss
10. Measurement of optical power using optical power meter.
11. Measurement of propagation loss using OPM.

Dr. C.V. RAMAN UNIVERSITY
Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Second Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSCP1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- QUANTUM MECHANICS II

UNIT – I

Approximation method for bound states: Rayleigh- Schrodinger Perturbation theory of non-degenerate and degenerate levels and their application to perturbation of an oscillator, Normal Helium atom and first order Stark effect in hydrogen, Variation method and its application to ground state of Helium, W K B Approximation method, Connection formulae and ideas on potential barrier with applications to theory of alpha decay.

UNIT – II

Time dependant perturbation theory: Methods of variation of constants and transition probability, adiabatic and sudden approximation, wave equation for a system of charged particles under the influence of external electromagnetic field, absorption and induced emission, Einstein's A and B coefficients and transition probability.

UNIT- III

Theory of Scattering, Physical concepts, scattering amplitude, scattering cross section, Born Approximation and partial waves, Scattering by perfectly rigid sphere, Complex potential and absorption, Scattering by spherically symmetric potential, Identical particles with spin, Pauli's spin matrices.

UNIT- IV

Schrödinger's relativistic equation (Klein-Gordon equation), Probability and current density, Klein - Gordon equation in presence of electromagnetic field, Hydrogen atom, Short comings of Klein-Gordon equation, Dirac's relativistic equation for free electron, Dirac's Matrices, Dirac's relativistic equation in electromagnetic field, negative energy states and their interpretation hydrogen atom, hyperfine splitting.

TEXT AND REFERENCE BOOK

- Quantum Mechanics (L. I. Schiff) TMH Ed.
- Advanced Quantum Mechanics(SatyaPrakash)Kedarnath&Ramnath Co. Meerut
- Quantum Mechanics (B. Craseman and J. J. Powell)Narosa Pub. Kolcatta
- Relativistic Quantum Mechanics (Bajorken&Drell) TMH Ed.
- Modern Quantum Mechanics (J.J. Sakurai)
- Quantum Mechanics (Mathews and Venkatessan)
- Quantum Mechanics (A .K.Ghatak and Loknathan)

Dr. C.V. RAMAN UNIVERSITY
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Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Second Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSCP2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- STATISTICAL MECHANICS

UNIT – I

Foundation of statistical mechanics, Specification of states of a system contact between statistics and thermodynamics, Classical ideal gas entropy of mixing and Gibb's paradox, Micro canonical ensemble, phase space, trajectories and density of states, Liouville theorem, Canonical and Grand canonical ensembles, Partition function, calculation of statistical quantities, Energy and density fluctuations.

UNIT-II

Statistics of ensembles, statistics of indistinguishable particles, density matrix, Maxwell-Boltzmann, Fermi Dirac and Bose- Einstein statistics, Properties of ideal Bose gases, Bose - Einstein condensation, properties of ideal Fermi gas, electron gas in metals, Boltzmann transport equation.

UNIT-III

Cluster expansion for a classical gas, Virial equation of state, Mean field theory of Ising model in 3, 2 and 1 dimension, Exact solution in one-dimension.

UNIT – IV

Thermodynamics fluctuation spatial correlation Brownian motion, Langevin theory, fluctuation dissipation theorem, Fokker-Planck equation, Onsager reciprocity relations

TEXT AND REFERENCE BOOK

- Statistical and thermal Physics (F. Reif) TMH Ed.
- Statistical Mechanics (K. Huang) TMH Ed.
- Statistical Mechanics (R. K. Pathria)
- Statistical Mechanics (Allis &Herling) TMH Ed.
- Statistical Physics (S. K. Sinha)Narosa Pub. Kolcatta
- Statistical Mechanics (SatyaPrakash and J.P. Agrawal) Kedarnath and Ramnath Co. Meerut

Dr. C.V. RAMAN UNIVERSITY
Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Second Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSCP3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- SOLID STATE PHYSICS

UNIT-I

Electron theory:Drude Model, Electrical and thermal conductivity, Wiedemann–Franz law,Lorentz theory, Somerfield theory of Metals, Boltzmann differential equation, Scattering processes, Relaxation-time approximation, Solution of the Boltzmann equation for metals, Electrical conductivity, Peltiercoefficient, Thermal conductivity, Thermoelectric power, transport and material properties.

UNIT-II

Electrons in a periodic lattice:Nearly free electron model, Bloch theorem, Kronig-Penneymodel, Metals–Semimetals–Semiconductors–Insulators, Tight binding approach, Fermi surface, de-Haas Van Alfen effect, Magnetoresistance, Quantum Hall effect.

UNIT-III

Elementary excitations:Polarizability and dielectric function of the electron gas, collectiveexcitations, Screening, Metal-insulator transition, electron-electron interaction, Polaritons, Polarons, Excitons, Ferroelectric effects.

UNIT-IV

Superconductivity: Macroscopic electromagnetic properties, Thermal properties, Isotope effect,Manifestations of energy gap, London theory, Two fluid model, Flux quantization, Single particle tunnelling, dc and ac Josephson effect, Quantum interference, electron-phonon interaction, Cooper pair, BCS theory for ground and excited states, High temperature superconductors.

Dr. C.V. RAMAN UNIVERSITY
Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Second Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSCP4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ATOMIC & MOLECULAR PHYSICS

UNIT –I

Quantum states of one electron atom, Atomic orbital, Hydrogen spectrum, Paulis principle, Spectra of alkali elements, Spin orbit interaction and line structure of alkali Spectra, Methods of molecular quantum mechanics, Thomas Fermi statistical model, Hartree and Hartreefock method, Two electron system, Interaction energy in L-S and J-J coupling, Hyperfine structure (qualitative), line broadening mechanisms(general ideas).

UNIT – II

Types of molecules, Diatomic linear, Symmetric top, asymmetric top and spherical top molecules, Rotational spectra of diatomic molecules as a rigid rotator, Energy level and Spectra of non-rigid rotator, intensity of rotational lines,

UNIT- III

Vibration energy of diatomic molecule, Diatomic molecule as a simple harmonic oscillator, Energy levels and spectrum, Morse potential energy curve, Molecules as vibrating rotator, Vibration spectrum of diatomic molecule PQR branches, IR spectrometer(qualitative)

UNIT-IV

Introduction to Ultraviolet, Visible and infra-red (IR)Spectroscopy, Raman spectroscopy, introduction, pure rotational and vibration spectra, Techniques and instrumentation, Photo electron spectroscopy, Elementary idea about photo acoustic spectroscopy and Mossbauer spectroscopy (principle).

TEXT AND REFERENCE BOOK

- Introduction to atomic spectra (H.E. White) TMH Ed.
- Fundamental of molecular spectroscopy (C.B. Banwell) TMH Ed.
- Application of Spectroscopy (H. Kaur)

- Introduction to molecular spectroscopy(G.M.Barrow)TMH Ed.
- The Atomic Nucleus (Evans) TMH Ed.
- Molecular Spectroscopy (Jeanne L and McHale)
- Molecular Spectroscopy (J.M.Brown)
- Atomic & Molecular Spectra (Rajkumar)Kedarnath and Ramnath Co. Meerut
- Elements Spectroscopy(Gupta, Kumar & Sharma)PragtiPrakashan.

Dr. C.V. RAMAN UNIVERSITY
Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Second Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:70 MIN.M:25**
COURSE CODE:-2MSCP5,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (SOLID STATE PHYSICS & ADVANCED ELECTRONICS)

Characteristics and application of MOSFET.

1. Study of Uni – Junction Transistor and its application.
2. Study of Basic Logic Gates, TTL, NAND, and NOR.
3. Study of wave form of Operational Amplifier (741).
4. Study of wave form Differential Amplifier.
5. Study of wave form Operational Amplifier as differentiator.

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SEMESTER- Second Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:70 MIN.M:25**
COURSE CODE:-2MSCP6,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (LASER & SPECTROSCOPY)

1. Measurement of wave length of given laser light.
2. Determination of Energy band gap of PN junction diode.
3. Study of Spectrophotometer.
4. To determine λ_{max} (wave length of maximum absorption) of solution of $KMnO_4$ using spectrophotometer.
5. Verify the Beer's law $\log\frac{I_0}{I} = A = \epsilon\, cl$.
6. Study of LASER beam.
7. Study and analysis of diffraction pattern using laser light.

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SEMESTER- Third Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSCP1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- CONDENSED MATTER PHYSICS

UNIT – I

Interaction of X-ray with matters, Absorption of X-rays, Elastic scattering from a perfect lattice, The reciprocal lattice and its application to diffraction techniques, The Lave, power and rotating crystal methods, Crystal structure factor and intensity diffraction maxima, Extinction due to lattice centring, Point defeats, line defects and planer (stacking) faults, The role of dislocation in plastic deformation and crystal growth, The observation of imperfections in crystals. X-ray and electron microscopic techniques

UNIT – II

Free electron Fermi gas, Energy levels of orbital in one and three dimensions,Electrons in a periodic lattice, Bloch theorem, Band theory of solids, Classification of solids effective mass. Tight binding, cellular and pseudo potential methods, Fermi surface, De-Hass Von Alfen effect, Super conductivity, critical temperature persistent current,Meissner effect, General idea about high temperature superconductors.

UNIT-III

Atomic and molecular Polarizibility, Claussius-Mossotti relation, types of Polarizibility, dipolar Polarizibility and frequency dependence of dipolar Polarizibility, ionic and electronic Polarizibility, Hall Effect. Quantum Hall Effects, Magneto resistance.

UNIT – IV

Weiss Theory of ferromagnetism, Heisenberg model and molecular field theory, Spin waves and magnous, Curie-waves law for susceptibility, Ferri and anti-Ferro-magnetic order.

TEXT AND REFERENCE BOOK

- Solid State Physics (C. Kittle) John Wiley Pub.
- Semiconductor Devices(S.M. Sze) John Wiley Pub.

- Introduction to Solid State Physics (L.V. Azaroff)
- Crystellographic Solid State Physics (Verma&Srivastava)
- Solid State Physics (A.J. Dekker)
- Principles of Condense Matter Physics(P.M.Chaiken&T.C. Lubensky)

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SEMESTER- Third Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSCP2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- NUCLEAR & PARTICLE PHYSICS

UNIT-I

Nuclear Interactions and Nuclear Reactions: Nucleon- nucleon interaction, Exchange forces and tensor forces, Meson theory of Nuclear forces, Nucleon - nucleon scattering, Effective range theory, Spin dependence of nuclear forces, Charge independence, Yukawa interaction. Direct and Compound nuclear reaction mechanisms, cross sections in terms of partial wave amplitude, Compound nucleus. Scattering matrix, reciprocity theorem, Breit-Winger one level formula, Resonance scattering.

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 moment and parities of nuclear ground states, qualitative discussion and estimates of transition rates, Magnetic moment and Schmidt lines, collective model of Bohr and Mottelson.

UNIT – III

Nuclear Decay :Beta Decay, Fermi theory of beta decay, comparative half lives, parity violation, two component theory of neutrino decay, detection and properties of neutrino, gamma decay, multiple transitions in nuclei, shape of the beta spectrum, total decay rate, Angular momentum and parity selection rules, General ideas of nuclear radiation detectors, linear accelerator, betatron, proton synchrotron, electron synchrotron.

UNIT – IV

Elementary particle: Types of interaction between elementary particles, Hadrons and Leptons symmetry and conservation laws, Elementary idea of CP and CPT invariance, classification of Hadrons, Lie algebra, SU(2), SU(3) multiples, Quark model, Gell-mann, Cosmic Rays : Nature, composition, charge and energy spectrum of primary cosmic rays, production and propagation of secondary cosmic rays, soft, penetrating and nucleonic component, origin of cosmic rays, Rossi curve, Bhabha- Heitlr theory of cascade showers.

TEXT AND REFERENCE BOOK

- Elements of Nuclear Physics (Pandya&Yadav)Kedarnath and Ramnath Co. Meerut
- Introduction to Modern Physics(Richtmyer, Kennard and Cooper) TMH Ed.
- Nuclear Physics (I Kaplon)
- Nuclear Physics (Roy & Nigam)
- Nuclear Physics (S.N. Ghoshal)S. Chand Co. Ltd.
- Nuclear Physics(D.C.Tayal) Himalaya Pub. House Mumbai

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SEMESTER- Third Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSCP3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ELECTRODYNAMICS

UNIT – I

Basics of electrostatics and magneto statics, Laplace's and Poisson equations, method of images, Biot-Sawart law, Ampere law, Maxwell's equations, Scalar and vector potentials, Gauge transformation, Lorentz gauge, Coulomb Gauge, Solution of Maxwell equations in conducting media radiations by moving charges, retarded potentials, Lienard-Wiechrt potentials, fields of charged particles in uniform motion.

UNIT-II

Fields of an accelerated charged particles at low velocity and high velocity, Angular distribution of power radiated, Invariance of electric charge, relativistic transformation properties of E and H fields, Electromagnetic fields tensor in 4-dimensional Maxwell equation, Four Vector current and potential and their invariance under Lorentz transformation, Co-variance of electrodynamics.

Lagrangian and Hamiltonian for a relativistic charged particle in external E M field,Motion of charged particles in electromagnetic field, Uniform and non uniform E and B fields.

UNIT –III

Elementary concept of occurrence of plasma, Gaseous and solid state plasma, Production of gaseous and solid state plasma, Plasma parameters, Plasma confinement pinch effect instability in a pinched- plasma column, Electrical neutrality in a plasma, Plasma oscillations: Transverse oscillations and longitudinal oscillations.

UNIT – IV

Domain of Magneto hydrodynamics and plasma Physics : Magneto hydrodynamic equations, Magnetic hydro-static pressure hydrodynamic waves: Magneto-sonic and Alfven waves, particle orbits and drift motion in a plasmas, Experimental study of Plasma, the theory of single and double probes.

TEXT AND REFERENCE BOOK

- Introduction to Electrodynamics(David J. Griffiths)PHI Pvt. Ltd.
- Plasma Physics (F.F. Chen)
- Electrodynamics (Gupta, Kumar, Singh)PragatiPrakashan
- Plasma state and matter (Sen)PragatiPrakashan
- Classical electrodynamics (Jackson)
- Classical electricity and Magnetism (Pamolsky& Philips)

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SEMESTER- Third Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSCP4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- DIGITAL ELECTRONICS & MICROPROCESSOR

UNIT – I

Communication Electronics: Amplitude modulation - generation of AM waves,Demodulation of AM waves, DSBSC modulation, Generation of DSBSC waves, coherent detection of DSBSC waves, SSB modulation, generation and detection of SSB waves, vestigial sideband modulation.

UNIT – II

Propagation of Waves: Ground Waves, sky wave, space wave, propagation, maximum usable frequency, skip distance, virtual height, fading of signals, Satellite communication: orbital satellite, geostationary satellites, orbital pattern, look angles, orbital spacing, satellite system, link modules.

UNIT – III

Microwave: Advantages and disadvantages of microwave transmission loss in free-space, propagation of microwaves, atmospheric effects on propagation, Fresnel Zone problem, used in microwave communication systems.

UNIT – IV

Microprocessors and Micro Computers: Microprocessor and Architecture: Intel 8086, Microprocessor architecture modes of memory addressing, 8086/8088 Hardware specification: Pin-outs and pin functions, clock generator (8284A) Bus buffering and latching, Bus timing, Ready and wait state, Minimum mode versus maximum mode.

TEXT AND REFERENCE BOOK

- Modern Digital Electronics(R.P.Jain)TMH Ed.
- Microwave Devices & Circuits (S.Y. Lio)Pearson
- Microwave Devices & Radar Engineering (Kulkarni)
- Digital Principles & Applications (Malvino& Leech)

- Microprocessor Architecture, Programming& Applications with 8085/8086(R.S. Gaonker)
- Intel Microprocessor(Barry B. Brey)Pearson
- Fundamentals of Electronics (Borker)
- Electronics and Communication Simplified (A.K.Maini) Khanna Pub.

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Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Third Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:70 MIN.M:25**
COURSE CODE:-3MSCP5,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (DIGITAL ELECTRONICS & COMMUNICATION)

1. Study and analysis of Amplitude Modulation and demodulation.
2. Study and analysis of Frequency / phase Modulation and demodulation.
3. Study of microwave propagation by using X-band setup.
4. Study of Characteristics of flip-flops.
5. Study and verification of de-Morgon's theorem.

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Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Third Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:70 MIN.M:25**
COURSE CODE:-3MSCP6,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (NUCLEAR & MICROPROCESSOR)

1. Study of Microprocessor 8085.
2. Study of Microprocessor 8086.
3. Study of Microprocessor 8088.
4. Study of pin function of clock generator for 8284A.
5. Study of Scintillation counter.
6. Study of Gamma ray coincidence spectrometer.
7. Study of GM counter.
8. Verification of Compton scattering formula.
9. Study of Compton spectra peak at different scattering angle.
10. Study of design structure of GM counter.

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Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- COMPUTATIONAL METHOD & PROGRAMMING

UNIT – I

Data type (int, float, double, char, long, long double etc.) operators (Unary. Binary and ternary), input /output statement (scan(), print()), control statements (if, for, while, do while, switch -case-default), Function (type of Function, function definition, function calling, formal arguments, actual arguments, function prototype), program structure, string (Array, character array), string manipulation functions like strlens(), strcpy(), strcat(), strecmp() etc.

UNIT-II

Method for determination of zeros of linear and non-linear algebraic equation and transcendental equations, convergence of solutions, solutions of simultaneous linear equation, Gaussian elimination method, pivoting, iterative method, Matrix inversion.

UNIT-III

Eigen Value and Eigen Vectors of Matrices, Power and Jacobi method, Finite difference interpolation with equally and unequally spread points, Curve fitting, polynomial least squares and cubic sp-line fittings.Numerical differentiation and integration, Newton-Cotes Formulae, error estimation, Gauss-Method.

UNIT – IV

Numerical solution of ordinary differential equation, Eular and Runga-Kutta Methods, predicators and corrector method, Elementary ideas of solution partial differential equation.

TEXT AND REFERENCE BOOK

- Introduction method of numerical analysis (Sastry)
- Numerical Analysis (Rajaraman)
- Programming with C (Gottfried)

- Programming with C (Balagururswamy)
- Numerical Analysis (Balaguruswamy)
- Numerical recipes press and Flannery(VettermingTeukolsky).

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Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- MATERIAL SCIENCE

UNIT – I

Classification of Materials: Crystalline, Polycrystalline, Amorphous (Introduction and their structure), Elementary idea of polymers (structure and properties methods of polymerization, Glasses: Structure and properties, Type of Glasses, Fracture in glasses, Composite Materials: Introduction, their types and properties, Different types of bonding, Medaling energy for ionic crystal.

UNIT – II

Phase Transitions: Thermodynamics of phase transformation, Free-energy calculation, I and II order transformation, Hume-Rother rule, solid solution and types of solid solutions, phase rule, One-, Two- component systems, Eutectic and paratactic phase diagrams, Lever rule, phase diagrams of Mg- Al, Fe-C Kinetics of transformations, Homogeneous and heterogeneous nucleation, Growth kinetics.

UNIT – III

Diffusion in Materials: Mechanism of diffusion, Energy of formation and motion, long distance motion, Rate theory of diffusion, Einstein relation (relation between diffusivity and mobility), Fick's laws of diffusion and solution of Fick's second law, Kirkendal effect, Diffusion of vacancies in ionic crystals, Experimental determination of Diffusion coefficient.

UNIT – IV

Transport Properties of Solids: Electrical conductivity of metals and alloys, Extrinsic, intrinsic semiconductors and amorphous semiconductors, Scattering of electrons by phonons, impurity, etc, Relaxation time, Carrier mobility and its temperature dependence, Mathiessio's rule for resistivity, temperature dependence of metallic resistivity.

TEXT AND REFERENCE BOOK

- Introduction to Solids (L. V. Azaroff)
- Introduction to Solid State Physics (C. Kittle)John Wiley
- Material Science and engineering (V. Raghawan)PHI Learning Pvt. Ltd.
- Diffusion Kinetics for Atoms in Crystals (Manning)
- Theoretical solid State Physics (Huang)
- Material Science and engineering (Tripathi, Padhy& Panda) Scitech Pub. Chennai

Dr. C.V. RAMAN UNIVERSITY
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Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PLASMA PHYSICS

UNIT – I

Occurrence of Plasma in Nature: Criteria for plasmas, Single particle motion in uniform and non uniform electric (E) and magnetic (B) fields, Time varying E and B field, Adiabatic invariants magnetic mirrors, Fluid equation of motion. Fluid drifts parallel and perpendicular to B. Plasma Oscillations, Electron Plasma waves, Ion Waves, Validity of Plasma approximation.

UNIT – II

Electrostatic electron and ion perpendicular to B, Electromagnetic waves with B0=0. Propagation Vector (K) perpendicular and parallel to B_0, Diffusion in weakly and fully ionized plasmas, Decay of Plasma by diffusion.

UNIT – III

Two stream instability, Gravitational Instability, Weibel instability, Equations of kinetic theory, Derivation of the Fluid equations Landau damping.

UNIT – IV

Ion acoustic shock waves,Pondermotive Force, Parametric Instabilities-Frequency matching, Instability threshold, Oscillating two stream instability, Plasma Echoes, The Problem of controlled Fusion, Magnetic confinement-Torous, Mirrors, Pinches, Plasma Heating Laserinduced Fusion.

TEXT AND REFERENCE BOOK

- Controlled Fusion(F.F.Chen-Volume-I)
- Introduction to Plasma Theory(D.R. Nicholson)
- The Plasma State (J L Shohet)

Dr. C.V. RAMAN UNIVERSITY
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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP4(A),CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ATMOSPHERIC SCIENCE (ELECTIVE PAPER)

UNIT-I

Physical Meteorology & Radar Meteorology : Atmosphere; atmospheric composition; law of thermodynamics of the atmosphere; adiabatic process; law of black body radiation; solar and terrestrial radiation; albedo; green house effect; heat balance of earth-atmosphere system. Basic meteorology-radar principles; use of weather radar in aviation.

UNIT-II

Dynamic Meteorology & Monsoon Dynamics: Fundamental forces; structure of static atmosphere; momentum; thermodynamics of dry atmosphere; voracity; potential vorticity. Wind; temperature & pressure distribution over India in the lower,middle, and upper atmosphere during pre/ post/and mid-monsoon season;energy cycle of monsoon; dynamics of monsoon; depressions and easterly waves.

UNIT- III

Numerical Methods For Atmosphere Models: Filtering of sound and gravity waves; filtered forecast equations; basic concepts of initialization and objective analysis for wave equation; advection equation and diffusion equation.

UNIT- IV

Atmospheric Pollution & Instrumentation System: Role of meteorology on atmospheric pollution; atmospheric boundary layer; air stability; wind structure; ekman spiral; turbulence boundary layer scaling; residence time and reaction rates of pollutants; sulpher compounds; nitrogen compounds; organic compounds; aerosol; radioactive particles. Ground based instruments for the measurement of temperature, pressure, humidity, wind and rainfall rate.

TEXT AND REFERENCE BOOK

- The Atmosphere –Frederic K.Lutgens and Edward J. Tarbuk

- Principles of Air Pollution Meteorology – Tom Lyons ; CBS Publishers & distributions (P) Ltd.
- Numerical Weather Prediction- G.J.Haltiner & R.T.Villians ; John Wiley and Sons, 1980

Dr. C.V. RAMAN UNIVERSITY

Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP4(B),CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICS OF NANO MATERIALS (ELECTIVE PAPER)

UNIT- I

Free electron theory; idea of band structure; metals; insulators; semiconductors; density of states in bands; variation of density of states with energy; band gap with size of crystal.

UNIT- II

Nanotechnology; definition of nanoscience & Nanotechnology. Structure of carbon nanotubes, nano wires; application of Nanotechnology in different field.

UNIT – III

Quantum size effect; idea of quantum well structure; quantum dots; quantum wires ; determination of particle size; increase in with of XRD peaks of nanoparticles; shift in photoluminescence peaks; variations in Raman spectra of Nanomaterials.

UNIT – IV

Different methods of preparation of Nanomaterials; Bottom up : cluster beam evaporation; ion beam deposition; chemical bath deposition with capping techniques and Top down : ball milling.

TEXT AND REFERENCE BOOK

- Physics of semiconductor nano structures- K.P.Jain; Narosa 1997.
- Nontechnology : Molecular Speculations on global abundance;-B.C.Crandall, MIT Press 1996.
- Nanoparticles and nanostructures films: Preparation characterization and application Ed. J.H.Fendler, John Wiley & Sons 1998.

Dr. C.V. RAMAN UNIVERSITY
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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP4(C),CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ENVIRONMENTAL PHYSICS (ELECTIVE PAPER)

UNIT – I

Essentials of Environmental Physics: Structure and thermodynamics of the atmosphere, Composition of air, Greenhouse effect, Transport of matter, energy and momentum in nature, Stratification and stability of atmosphere, Laws of motion, hydrostatic equilibrium.

UNIT – II

Solar and Terrestrial: Physics of radiation. Interaction of light with matter, Rayleigh and Mie scattering, Laws of radiation (Kirchoffs law, Planck's law, Wien's displacement law, etc.), Solar and terrestrial spectra, UV radiation, Ozone depletion problem, IR absorption.

UNIT – III

Environmental Pollution and Degradation: Elementary fluid dynamics, Diffusion, Turbulence and turbulent diffusion, Factors governing air, water and noise pollution, Air and water quality standards, Waste disposal, Gaseous and particulate matters, Wet and dry deposition.

UNIT – IV

Environmental Changes and Remote Sensing: Energy sources and combustion processes. Renewable sources of energy: Solar energy, wind energy, bio energy, hydropower, fuel cells, nuclear energy. Global and Regional Climate: Elements of weather and climate, Stability and vertical motion of air, Horizontal motion of air and water, Pressure gradient forces,Viscous forces.

TEXT AND REFERENCE BOOK

- Environmental Physics(Egbert Boeker&rienk Van Groundelle)John Wiley
- The Physics of Atmosphere (J.T. Hougtion)Cambridge Univ. Press
- Renewable Energy Resources(J.Twidell and J. Weir)Eibs, 1988
- An Introduction to Solar Energy for Scientists and Engine (Sol Wieder)John Wiley,
- The Physics of Monsoons (R.N. keshavamurthy and M. ShankerRao)
- Numerical Weather Prediction(G.J. Haltiner and R.T. Williams)

Dr. C.V. RAMAN UNIVERSITY
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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSCP4(D),CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- COMMUNICATION ELECTRONICS (ELECTIVE PAPER)

UNIT – I

Binary Logic, Digital Switching Circuits, Counter: Binary number systems and other codes, Binary arithmetic, Boolean theorem, syntheses of Boolean functions, Karnaugh diagram, Half and full adders, demultiplexers, Multiplexers, D/A and A/D converters. Transistor as a switch, Clock generator, RS flip flip-flop, T flip flop, JK flip flop, Master- Slave flip flop, Shift Register, ripple counter, Decade counter, up-down counter, divide by n counters, Synchronous counters, Application of counters.

UNIT – II

OP-AMP: Differential amplifier circuit configurations: dual input balanced output dual input, single input unbalanced output (ac analysis) only, block diagram of a typical op amp analysis, schematic symbol of an op- amp., Ideal op-amp., Op-amp parameters; input offset voltage, input offset current, input bias current, CMRR, SVRR, large signal voltage gain, Slew rate, Gain band width product, output resistance, supply currents power consumption, inverting and non-inverting inputs.

UNIT –III

Application of OP-AMP: Inverting and non-inverting amplifier, summing, scaling and averaging amplifier, integrator and differentiator. Oscillator Principles: oscillator types, frequency, stability response, the phase shift oscillator, Wein-bridge oscillator, L-C tunable oscillator, square wave generator.

UNIT – IV

Digital Communications: Pulse-Modulation system, sampling theorem, Low pass and Band pass signals, PAM, channel BW for a PAM signal, Natural Sampling, Flat top sampling, signals Recovery through Holding, Quantization of signals, Quantization, Differential PCM Delta

Modulation, Adaptive Delta Modulation, CVSD.

TEXT AND REFERENCE BOOK

- Digital Principles and Application (A. P. Melvino& D. P. Leech)
- Op-Amps & Linear Integrated circuits (R. A. Gayakwad)
- Electronics (D. S. Mathur)
- Digital Communications (W. Tomasi)

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.PHYSICS **PRACTICAL MAX.M:140 MIN.M:50**
COURSE CODE:-4MSCP5,CREDIT-4 **VIVA. MAX.M: 60 MIN. M: 22**
COURSE:- PROJECT WORK

PROJECT

All the candidates of M.Sc.(Physics) are required to submit a project-report based on the work done by him/her during the project period. A detailed Viva shall be conducted by an external examiner based on the project report. Students are advised to see the detailed project related guidelines on the website of CVRU. (www.cvru.ac.in) under Project Guidelines for student section.

COUNSELING AND STUDY STRUCTURE

Course Code	Subjects	Credit	Total Hours of study	Counseling and study structure (Hours)			
				Face to face counseling	Self Study	Practical /Project	Assign ments
First Semester							
1MSCP1	Mathematical Physics	3	90	12	51	-	27
1MSCP2	Classical Mechanics	3	90	12	51	-	27
1MSCP3	Quantum Mechanics-I	3	90	12	51	-	27
1MSCP4	Electronic Devices	3	90	12	51	-	27
1MSCP5	Lab–Electronics	2	60	8		52	
1MSCP6	Lab - Fiber optics	2	60	8		52	
Total		**16**					
Second Semester							
2MSCP1	Quantum Mechanics-II	3	90	12	51	-	27
2MSCP2	Statistical Mechanics	3	90	12	51	-	27
2MSCP3	Solid State Physics	3	90	12	51	-	27
2MSCP4	Atomic & Molecular Physics	3	90	12	51	-	27
2MSCP5	Lab-SSP &AE	2	60	8	-	52	-
2MSCP6	Lab-Laser & Spectroscopy	2	60	8	-	52	-
Total		**16**					
Third Semester							
3MSCP1	Condensed Matter Physics	3	90	12	51	-	27
3MSCP2	Nuclear & Particle Physics	3	90	12	51	-	27
3MSCP3	Electrodynamics	3	90	12	51	-	27
3MSCP4	Digital Electronics &	3	90	12	51	-	27
3MSCP5	Lab-DE & Communication	2	60	8	-	52	-
3MSCP6	Lab– Nuclear Physics &	2	60	8	-	52	-
Total		**16**					
Fourth Semester							
4MSCP1	Computational Methods & Programming	3	90	12	51	-	27
4MSCP2	Material Science	3	90	12	51	-	27
4MSCP3	Plasma Physics	3	90	12	51	-	27

4MSCP4	**Elective Paper-** Atmospheric Science**/**Physics of Nano Materials**/**Environmental Physics**/**Communication Electronics/Computer Architecture, Networking & assembly Level Programming	3	90	12	51	-	27
4MSCP5	Project Work	4	120	16		104	
Total		**16**					

STUDY MODULES AND BOOKS INFORMATION

Course Code	Name of the Course	Books / Module to be used
SEMESTER-I		
1MSCP1	Mathematical Physics	Module Published by CVRU
1MSCP2	Classical Mechanics	Module Published by CVRU
1MSCP3	Quantum Mechanics I	Module Published by CVRU
1MSCP4	Electronic Devices	Module Published by CVRU
SEMESTER-II		
2MSCP1	Quantum Mechanics II	Module Published by CVRU
2MSCP2	Statistical Mechanics	Module Published by CVRU
2MSCP3	Solid State Physics	Module Published by CVRU
2MSCP4	Atomic & Molecular Physics	Module Published by CVRU
SEMESTER-III		
3MSCP1	Condensed Matter Physics	Module Published by CVRU
3MSCP2	Nuclear & Particle Physics	Module Published by CVRU
3MSCP3	Electrodynamics	Module Published by CVRU
3MSCP4	Digital Electronics & Microprocessor	Module Published by CVRU
SEMESTER-IV		
4MSCP1	Computational Methods & Programming	Module Published by CVRU
4MSCP2	Material Science	Module Published by CVRU
4MSCP3	Plasma Physics	Module Published by CVRU
4MSCP4	Elective Paper- Atmospheric science/ Physics of Nano Materials/Environmental Physics/Communication Electronics/Computer Architecture, Networking & assembly Level Programming	Module Published by CVRU

DATE SCHEDULE & INSTRUCTIONS FOR SUBMITTING ASSIGNMENTS

DUE DATE OF SUBMISSION OF ALL ASSIGNMENTS AT THE STUDY CENTRE		
Semester	Assignment No.	Due Date
First Semester	1MSCP1 1MSCP2 1MSCP3 1MSCP4	• April 30 (for January Session) • October 31 (for July session)
Second Semester	2MSCP1 2MSCP2 2MSCP3 2MSCP4	• October 31 (for January Session) • April 30 (for July session)
Third Semester	3MSCP1 3MSCP2 3MSCP3 3MSCP4	• April 30 (for January Session) • October 31 (for July session)
Fourth Semester	4MSCP1 4MSCP2 4MSCP3 4MSCP4	• October 31 (for January Session) • April 30 (for July session)

Note: Assignments of the course are available for download at the CVRU Website http://www. cvru.ac.in . You can download the assignments as per your course, follow the instructions given and submit it before due dates at the study centre.

INSTRUCTIONS TO STUDENTS FOR FORMATTING THE ASSIGNMENTS
सत्रीय कार्य हेतु छात्रों के लिये निर्देश

1. This booklet contains the assignments for the entire (All Semester) programme. Each course has one assignment. All assignments should be completed and submitted at IODE CVRU/ study centre before the due date.
इस पुस्तिका में पूरे पाठ्यक्रम के लिये (सभी सेमेस्टर) के सत्रीय कार्य दिये गये हैं। प्रत्येक पाठ्यक्रम के लिये एक सत्रीय कार्य दिया गया है जिसे पूर्ण करने के पश्चात निर्धारित तिथि तक डॉ. सी. वी आर.यु के दूरस्थ षिक्षा संस्थान / अध्ययन केन्द्र को भेजना आवश्यक है।

2. Please note that you will not be allowed to appear for the Term End Examinations for the course, until the assignments are submitted before the due date.
कृपया ध्यान रहे जब तक सत्रीय कार्य निर्धारित तिथि तक जमा नहीं होंगे, आप सत्रांत परीक्षा में नहीं बैठ सकेंगे।

3. The assignments constitute the continuous component of the evaluation process and have 30% weightage in the final grading. You need to score minimum marks as per Examinations Scheme of Particular Programmme in assignment in each course in order to clear the continuous evaluation component.
सत्रीय कार्य सतत् मूल्यांकन का महत्वपूर्ण अंग है एवं अन्तिम ग्रेडिंग में 30 प्रतिशत अंक निर्धारित हैं। सतत् मूल्यांकन में उत्तीर्ण करने हेतु प्रत्येक सत्रीय कार्य में संबंधित कार्यक्रम के परीक्षा योजना के अनुसार न्यूनतम अंक प्राप्त करना अनिवार्य है।

4. The assignment should be hand written on a A-4 size paper with proper cover which contains all the required information as given on the next page. You can use the photocopy of the cover for each assignment.
सत्रीय कार्य ए–4 साइज पेपर पर हस्तलिखित होना चाहिए तथा उस पर अगले पृष्ठ पर दिये गये कवर के अनुसार सभी जानकारी लिखी होनी चाहिए। (आप चाहें तो कवर की फोटोप्रति प्रत्येक सत्रीय कार्य पर लगाकर प्रयुक्त कर सकते हैं)

5. Leave at least 4cm margin on the left, top and bottom of your answer sheets for the evaluator's comments.
प्रत्येक पृष्ठ पर बायें, ऊपर एवं नीचे कम से कम 4 सें.मी. जगह छोड़ें जो मूल्यांकनकर्ता अपनी टिप्पणी के लिये प्रयोग करेगा।

6. Your answers should be brief, precise and in your own words. Please do not copy the answers from the study material.
सत्रीय कार्य के प्रश्नों के उत्तर संक्षेप, स्पष्ट एवं स्वयं के शब्दों में होना चाहिए। उत्तर स्टडी मटेरियल की कॉपी नहीं होना चाहिये।

7. Please do not copy the assignment from other student.
कृपया सत्रीय कार्य दूसरे छात्र से कॉपी न करें।

8. While solving the questions, clearly indicate the question number along with the part being solved. Recheck your work before submitting it.
प्रश्नों के उत्तर लिखते समय, प्रश्न संख्या अथवा उसके भाग का स्पष्ट उल्लेख करें। सत्रीय कार्य जमा करते समय एक बार पुनः जांच कर लें।

9. You may retain a copy of your assignment response to avoid any unforeseen situation.
सत्रीय कार्य की एक प्रतिलिपि अपने पास रखें ताकि किसी अनहोनी घटना से बचा जा सके।

10. You can resolve the difficulties you may face while studying the course material by sending an e-mail to Programme coordinator IODE CVRU/ study centre coordinator. However, the coordinator will not provide solutions to the assignment questions, since they constitute an evaluation component.
पाठ्यक्रम सामग्री के अध्ययन के समय यदि कोई कठिनाई होती है तो उसके निराकरण हेतु कार्यक्रम समन्वयक दूरस्थ षिक्षा संस्थान डॉ. सी. वी. रामन् विष्वविद्यालय / अध्ययन केन्द्र के समन्वयक से ई–मेल द्वारा संपर्क किया जा सकता है। परंतु समन्वयक सत्रीय कार्य के प्रश्नों के उत्तर नहीं देंगे क्योंकि ये मूल्यांकन पद्धति के अंग हैं।

Note: Assignments of the course are available for download at the CVRU Website http://www.cvru.ac.in . You can download the assignments as per your course, follow the instructions given and submit it before due dates at the IODE CVRU/study centre.

GUIDELINE FOR PREPARATION AND PRESENTATION OF PROJECT REPORT

INSTITUTE OF OPEN AND DISTANCE EDUCATION
DR. C.V. RAMAN UNIVERSITY
KARGI ROAD, KOTA, DISTT. - BILASPUR
CHHATTISGARH

PROJECT REPORT FORMAT

IODE PROGRAMME

The Project Report consists of three main parts (i) The Preliminaries (ii) The Text (iii) Annexure. It is to be arranged in the following sequence.

THE PRELIMINARIES:

- Title Page (Outer Cover) as per the format given in Annexure III, (should be printed in White Colour on a Navy Blue background).
- Title Page (Inner Cover) as per the format given in Annexure IV
- Declaration by the candidate (Annexure – V)
- Certificate of Supervisor/s (Annexure – VI)
- Acknowledgements (Annexure – VII)
- Table of Contents (Annexure – VIII)
- Abstract/Preface
- List of Tables (If applicable)
- List of Figures (If applicable)
- List of abbreviations (Optional)
- Chapter –I to ….continue according to the table of contents.

THE TEXT OF THE PROJECT REPORT

The text the Project Report is usually divided in to chapter's with subheadings, within the chapters to indicate the orderly progression of topics and their relation to each other

Chapter-I Introduction: - The Project Report should normally begin with a general introduction presenting an overview of the purpose and significance of the study. The introduction should show why the topic selected is worth investigating. This will normally be done with reference to existing research, identifying areas that have not been explored, need to be explored. The final section of the introduction should provide a brief overview of each of the main chapters that the reader will encounter.

Chapter-II Review of Related Literature: - The purpose of the literature review is to summarize, evaluate and compare the main developments and current database in the field which are specifically relevant to the subject of research embodied in the Project Report .

Chapter-III Research Methology: - The supervisor and the student may decide how this part of the Project Report should be structured. Although this section varies depending up on method and analysis technique chosen, the chapter describes and justifies the methods chosen for the study and why this method was the most appropriate.

Chapter-IV Observations & Analysis:- Observations , Analysis and Interpretation should be done as per data collected from sample.

Chapter-V Results Conclusions and Suggestions: The results are actual statement of observations, including statistics, tables and graphs. Do not present the same data as graph as well as table. Use one of the appropriate style of presentation. The purpose of this chapter is not just to reiterate the findings but discuss the observation in relation to the theoretical body of knowledge on the topic.

Bibliography Citation in Text: Citation in the text usually consists of the name of the author(s) and the year of the publication. The page no is added when utilizing a direct quotation. It should be arranged Alphabetically .

Example (i):Thomas.V (2007) identified….

Example (ii): Gould and Brown (1991, p. 14) used the

Example (iii) : Rhoades et. al (2008) define the …..

References: All publications listed in the Project Report should be presented in a list of references, following the sample.

Citation from Project Report :

- Kundur., D. (1999),Mulitresolution Digital Watermarking: Algorithms and Implications for Multimedia Signals. Ph.D Project Report , University of Toronto.

Citation from Journal:

- Clifford, G. D. and Tarassenko.,s L. (2001),One-pass Training of Optimal Architecture Auto-associativeNeural Network for Detecting Ectopic Beats. Electron Letters. 37(18): 1126–1127.
- Rhoades, B.E. (1997), A Comparison of various definitions of Contractive mappings, Trans.Amer.Math.Soc.,Vol. 5, no.3, 257-290.

Citation from Books:

- Thompson, D. ed., (1995),The Concise Oxford Dictionary of Current English. Oxford, UK: Oxford University Press, 9th ed. ISBN No.: 0987654.
- Lindsay, D. (1999),A Guide to Scientific Writing, Melbourne, Chapter 2, Australia: Addison Wesley Longman Australia, 2nd ed. ISBN No.: 12345678.

Citation from Website:
Anonymous, unZign, “Tool for Evaluating a Variety of Watermarks”, http://altern.org/watermark/, (Browsing date: 23rd September 1997)
Publication of the University of Geneva (on digital watermarking): <http:// cuiwww.unige.ch/˜vision/Publications/watermarking_publications.html> (Browsing Date: 4thJanuary 2006)

Citation from patent:
Gustafsson J. K. (1976), “Analog-digital converter for a resistance bridge”, Patent U. S. 3960010, June 1,.
References must be given alphabetically in References section and in text as …..
Clifford. G. D. and Tarassenko. L. (2001) suggested that……

Appendices:

- Questionnaire /Formula /Diagnosis/Any other Supporting Documents

GUIDELINES FOR WRITING :-

1. Font size For English **Font size For Hindi**

Title Page	18-24	18-24
Headings / subheadings	12-16	16-20
Text	12	14
Footnotes	8-10	10-12

Footnotes be given on the same page where reference is quoted

2. Type style

Times New Roman for English Kruti dev 10 for Hindi

3. Margins.

At least 1¼ -1½ inches (3.17-3.81cm) on the left-hand side, 3/4 - 1 inch (2 -2.54cm) at the top and bottom of the page, and about ½ - 0.75 inches (1.27 - 1.90cm) at the outer edge. The best position for the page number is at top-center or top right ½ inch (1.27 cm) below the edge. Pages containing figures and illustration should be suitable paginated.

4. The *Project Report* shall be computer typed (**English**- British, Font Style -Times Roman, Size-12 point, **Hindi-** Font Style -Krutidev-10,Size-14) and printed on A4 size paper.

5. The *Project Report* shall be typed on one side only with double space with appropriate margin.

6. Use only standard abbreviations. Avoid abbreviations in the title. The full term for which an abbreviation stands should precede its first use in the text except in case of measurement units. The measurement units if any shall be followed consistently.

7. Maintain uniformity in writing the *Project Report* .

8. All copies of the *Project Report* are to be bound in colored hard cover (according to color code) of the *Project Report* .

9. The final submission of the *Project Report* shall be in 03 hard bound copies and 01 soft copy (MS Word) in a CD along with all the corrections and suggestions as recommended before.

ANNEXURE-III (Outer cover

THE TITLE OF THE PROJECT REPORT IN THE OUTER COVER SHALL LOOK EXACTLY LIKE THIS TITLE

(Font: Times New Roman, Size:16, Bold, Line Spacing: 1 ½, Centered)

{Here put a gap of 4 lines}

Project Report submitted to

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

<University's logo>

INSTITUTE OF OPEN AND DISTANCE EDUCATION

Dr. C.V. Raman University

Kota, Bilaspur (C.G.)

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of one line}

For the award of the degree of

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

PROGRAMME NAME

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of two lines}

by

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of two lines}

<NAME OF THE STUDENT>

(Font: Times New Roman, Size: 14, Bold, centered)

Registration No.: <>

(Font: Times New Roman, Size: 12, Bold, centered)

<Year>

(Font: Times New Roman, Size: 12, Bold, centered)

(Font: Times New Roman, Size: 10, Bold, Centered)

ANNEXURE-IV(Inner cover)

THE TITLE OF THE PROJECT REPORT IN THE INNER COVER SHALL LOOK EXACTLY LIKE THIS TITLE

(Font: Times New Roman, Size:16, Bold, Line Spacing: 1 ½, Centered)

{Here put a gap of 4 lines}

Project Report submitted to

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

INSTITUTE OF OPEN AND DISTANCE EDUCATION

Dr. C.V. Raman University

Kota, Bilaspur (C.G.)

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of one line}

For the award of the degree

of

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

PROGRAMME NAME

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of two lines}

by

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of two lines}

<NAME OF THE STUDENT>

(Font: Times New Roman, Size: 14, Bold, centered)

Under the Guidance of

(Font: Times New Roman, Size: 12, Bold, centered)

<NAME OF THE SUPERVISOR/S>

(Font: Times New Roman, Size: 14, Bold, centered)

<Year>

(Font: Times New Roman, Size: 12, Bold, centered)

(Font: Times New Roman, Size: 10, Bold, Centered)

ANNEXURE-V

DECLARATION

I the undersigned solemnly declare that the Project Report entitled "**title of the work**" is based on my own work carried out during the course of my study under the supervision of < name of supervisor >.

I assert that the statements made and conclusions drawn are an outcome of my research work. I further certify that

i. The work contained in the Project Report is original and has been done by me under the general supervision of my supervisor (s).

ii. The work has not been submitted to any other Institute for any other Degree/Diploma/Certificate in this University or any other University of India or abroad.

iii. I have followed the guideline provided by the University in writing the Project Report.

iv. I have conformed to the norms and guidelines given in the concerned Ordinance of the University.

v. Whenever I have used materials (data, theoretical analysis, and text) from other sources, I have given due credit to them by citing them in the text of the Project Report and giving their details in the references.

vi. Whenever I have quoted written materials from other sources, I have put them under quotation marks and given due credit to the sources by citing them and giving required details in the references.

(Name & Signature of the Student)

Registration No.

ANNEXURE-VI

CERTIFICATE

This is to certify that the work incorporated in the Project Report entitled " title of the Project Report " is a record of own work carried out by **<Name of Student >** under my supervision for the award of degree of **Programme Name** of Institute of Open and Distance Education Dr. C.V. Raman University, Bilaspur (C.G.)-India.

To the best of my knowledge and belief the Project Report :

i. Embodies the work of the candidate himself/herself,

ii. Has duly been completed.

iii. Is up to the desired standard both in respect of contents and language for being referred to the examiners.

Supervisor-

(Name and signature of the Supervisor
With designation and Name of Organization)

(Signature of Academic Coordinator)

(Seal of IODE)

ANNEXURE-VII

ACKNOWLEDGEMENT

Acknowledgements should be brief and should not exceed one page. Acknowledgements should be duly signed by the candidate. Gratitude may be expressed to only those who really contributed to the work directly or indirectly. Name of student should appear at the bottom of the page.

SAMPLE ACKNOWLEDGEMENT

It is a matter of immense pleasure to express the overwhelming sense of gratitude, devotion, incontestable regards to my esteemed & learned guides <…….> who have striven to perfect my project report.

……

……

……..

Finally, I express my indebtedness to all who have directly or indirectly contributed to the successful completion of my project work.

< Name of Student >

ANNEXURE-VIII

TABLE OF CONTENTS

NOTE