MAHARAJA AGRASEN INTERNATIONAL COLLEGE
NAAC Accredited B+
(Run By Shree Maharaja Agrasen Charitable Trust)
Affiliated to Pt. Ravishankar Shukla Universiry,Raipur
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MAHARAJA AGRASEN INTERNATIONAL COLLEGE, RAIPUR (C.G.)

(B+ Grade by NAAC Affiliated to Pt. Ravishankar Shukla University, Raipur)

Academic Year

2021-22

Syllabus for B.Sc. (Computer Science)

Department of Computer Science

MAHARAJA AGRASEN INTERNATIONAL COLLEGE

(B+ Grade by NAAC Affiliated to Pt. Ravishankar Shukla University, Raipur)

Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc.**	Program Code: **122**
Name of the Course: **Foundation Course Paper II English Language**	Max. Marks: **75** Min. Marls: **26**
Course Code: **0842**	Total Duration: **81 hrs.**

Course Objective:

1. The primary objective of English learning is to equip the student with requisites of grammar.
2. The syllabus provides an in-depth knowledge about Indian culture, Indian Art and Tradition, Scientific knowledge and Literature content.
3. The focus of the subject is to generate adequate English Writing Skills and Presentation techniques.
4. There is extensive learning of the Prose Content and minimal learning of Poetry.
5. The step-by-step learning pattern of grammar is a positive trait of all the objectives.

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	Short answer questions to be assessed by (Five short answer questions of three marks each)	45	15
2	(a) Reading comprehension of an unseen passage (b) Vocabulary	4	15
3	Report writing	6	15
4	Expansion of an idea	6	15
5	Grammar and Vocabulary based on the prescribed text book. Question on all the units shall be asked from the prescribed text which will comprise specimens of popular creative/writing and the following: (a) Matter & Technology: State of matter and its structure Technology (Electronics Communication, Space Science) (b)Our Scientists & Institutions: Life & work of our eminent scientist Arya Bhatt. Kaurd Charak Shus Nagarjuna, J.C. Bose and C.V. Raman, S. Rmanujam, Homi J. Birbal Sahani. Indian Scientific Institutions (Ancient & Modern)	20	15

Course Outcomes:

1. The student becomes well versed in grammar and its applicability.
2. The student is more connected to his/ her roots with the content of the syllabus.
3. The practice sessions of the Writing skills develop expertise of the students.
4. The prose content is easy to learn and its expression is simple.
5. Revision of grammar and question papers make the student handle his exams with expertise.

Books Prescribed:

1. For B.A./B.Sc./B.Com./B.H.Sc. II year Foundation course, English Language: Foundation English for U.G. Second Year - Published by M.P. Hindi Granth Academy, Bhopal

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc.**		Program Code: **202**
Name of the Course: **Hindi Language**		Max Marks: **75**
Course Code : **0841**	Total Duration- 91 Hrs.	(Internal : **75**)

Course Objective:

पाठयक्रम द्वारा प्रमुख रूप से विद्यार्थियों में राजभाषा एवम् राष्ट्रभाषा हिंदी के प्रति चेतना जागृत करवाना। महापुरूषों के निबंध द्वारा विद्यार्थियों में नैतिकता का विकास प्रमुख उद्देष्य है। छत्तिसगढ़ के प्रसिद्ध व्यक्तित्व से परिचित करवाना एवम् अनुवाद की समझ विकसित करना। व्याकरणगत अषुद्धियों के प्रति सतर्क करना।

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	(क) चोरी और प्रायष्चित– महात्मा गांधी (ख) कार्यालयीन भाषा (ग) मीडिया की भाषा	18	15
2	(क) युवकों का समाज में स्थान आचार्य – नरेन्द्र देव (ख) वित्त और वाणिज्य की भाषा (ग) मशीनी भाषा	19	15
3	(क) मातृभूमि – वासुदेव शरण अग्रवाल (ख) संज्ञा (ग) सर्वनाम (घ) विशेषण (द) क्रिया विशेषण	18	15
4	(क) डॉ खूबचंद बघेल – हरि ठाकुर (ख) समास (ग) संधि	18	15
5	(क) सम्भाषण – कुशलता पं माधवराव सप्रे (ख) अनुवाद– अंग्रेजी से हिन्दी में अनुवाद (ग) संक्षिप्तियॉ	18	15

Learning Objective:

1. विद्यार्थियों में सद्गुणों का विकास होता है।
2. भाषा के विविध रूप के ज्ञान से कार्यालयीन पत्र लेखन में पारंगतता हासिल होती है।
3. अनुवाद कला कैरियर निर्माण में सहायक है।
4. प्रतियोगी परीक्षाओं के लिए दक्षता हासिल होती है।

References:

1. हिंदी के श्रेष्ठ निबंध एवं प्रयोगगत व्याकरण – छत्तीसगढ़ राज्य हिंदी ग्रंथ अकादमी
2. हिंदी व्याकरण – कामताप्रसाद गुरू

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc.**		Program Code: **BSc II**
Name of the Course: **Maths I ADVANCE CALCULUS**		Max Marks: **50**
Course Code: **0848**	Total Duration- **90 Hr**	

Course Objective: Student will develop computational skills in first-year calculus and understanding the solving procedure about the topic:

1. Limit And Continuity of function
2. Envelopes, Evolutes
3. Beta and Gamma functions.
4. Double and triple Integral

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	Definition of a sequence. Theorems on limits of sequences.	18	20
	Bounded and monotonic sequences.		
	Cauchy's convergence criterion. Series of non-negative terms.		
	Comparison test, Cauchy's integral test, Ratio test, Raabe's test, logarithmic test, De-Morgan and Bertrand's test (without proofs)		
	Alternating series. Leibnitz's		
	Conditional convergence.		
2	Continuity of functions of one variable	20	20
	sequential continuity		
	Properties of continuous functions.		
	Uniform continuity.		
	Chain rule of differentiability.		
	Mean value theorems and their geometrical interpretations.		
	Darboux's intermediate value theorem for derivatives.		
3	Limit and continuity of functions of two variables.	18	20
	Partial differentiation.		
	Change of variables.		
	Euler's theorem on homogeneous functions.		
	Taylor's theorem for functions of two variables		
	Jacobians.		
4	Envelopes	16	20
	Evolutes		
	Maxima and Minima and Saddle points of functions of two variables.		
	Lagrange's multiplier method		
	Intermediate forms.		

5	Beta and Gamma functions.	18	20
	Double and triple integrals.		
	Dirichlet's integrals,		
	Change of order of integration in double integrals.		

Course Outcome: Students will be able to

1. Understand completeness and compactness and limits
2. Use differentiation for multivariate functions to find relative extrema and rates of change.
3. Understand Darboux's Intermediate Value Theorem
4. Understand how to change the order of integration.

Reference

1. Real Analysis, R.R. Goldberg, Oxford & I.B.H Publishing co., New Delhi
2. Differential Calculus, Gorakh Prasad, Pothishala Pvt. Ltd. Allahabad.
3. Integral Calculus, Gorakh Prasad, Pothishala Pvt. Ltd. Allahabad.

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc. II**		Program Code:
Name of the Course: **Maths II Differential Equation**		Max Marks: **50**
Course Code: **0849**	Total Duration- **95 Hrs**	(External: **50**)

Course Objective: This course is intended to expose

1. To the basic ideas of differential equations.
2. To combined with some ideas from linear algebra.
3. To be successful, a student must be able to the end of the class to solve the majority of the problems with no external help.

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	Series solutions of differential equations: Power series method, Bessel and Legendre Functions and their properties-convergence, recurrence and generating relations Orthogonality of functions. Sturm-Liouville problem. Orthogonality of eigen functions Reality of eigenvalues. Orthogonality of Bessel functions and Legendre polynomials	19	10
2	Laplace Transformation Linearity of the Laplace transformation, Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals, Shifting theorems Differentiation and integration of transforms. Convolution theorem Solution of integral equations and systems of differential equations using the Laplace transformation	19	10
3	Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method of solution.	19	10
4	Partial differential equations of second and higher orders. Classification of linear partial differential equations of second order. Homogeneous and non-homogenous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficient. Monge's methods.	19	10

5	Calculus of Variations: Variational problems with fixed boundaries-Euler's equation for functionals containing first order derivative and one independent variable. Extremals. Functionals dependent on higher order derivatives. Functional dependent on more than one independent variable Variational problems in parametric form. Invariance of Euler's equation under co-ordinates transformation. Variational Problems with Moving Boundaries: Functionals dependent on one and two functions. One sided variation. Sufficient conditions for an Extremum-Jacobi and Legendre conditions. Second variation, Varianona principle of least action	19	10

Course Outcome: Students will be able to

1. Understand the basic ideas of differential equations.
2. Combine their ideas with linear algebra.
3. Solve the majority of the problems with no external help.

Reference:

1. Integral Transforms, Sharma and Gupta, Pragati, Prakashan Meerut.
2. Differential Equation, Sharma and Gupta, Pragati, Prakashan Meerut.
3. Differential Equation, Raysinghania, S. Chand & Company, New Delhi.

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc. 2**		Program Code:
Name of the Course**: Maths III Mechanics**		Max Marks: **50**
Course Code: **0850**	Total Duration- **90 Hrs**	(External: **50**)

Course Objective: This Course will enable

1. To understand analytical conditions of Equilibrium of coplanar forces, Stable and unstable equilibrium. Virtual work. Centenary.
2. To learn Forces in three dimensions and Simple harmonic motion. Elastic strings, Projectile, Central orbits.
3. To understand Kepler's laws of motion, velocities and acceleration in tangential and normal directions, Motion on smooth and rough plane curves.
4. To provide the knowledge of Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions.

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	Analytical conditions of equilibrium of coplanar forces, Stable and unstable equilibrium. Virtual work. Centenary.	18	10
2	Forces in three dimensions, Poinsot's central axis, Null lines and planes.	18	10
3	Simple harmonic motion. Elastic strings. Velocities and accelerations along radial and transverse directions, Projectile, Central orbits.	18	10
4	Kepler's laws of motion, velocities and acceleration in tangential and normal directions, Motion on smooth and rough plane curves.	18	10
5	Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions,	18	10

Course Outcome: Students will be able to

1. Understand analytical conditions of Equilibrium of coplanar forces, Stable and unstable equilibrium. Virtual work. Centenary.
2. Learn Forces in three dimensions and Simple harmonic motion. Elastic strings, Projectile, Central orbits.
3. Understand Kepler's laws of motion, velocities and acceleration in tangential and normal directions, Motion on smooth and rough plane curves.

4. Provide the knowledge of motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions.

References:

1. S.L. Loney, Staties, Macmillan and Company, London.
2. R.S. Verma, A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad.
3. S.L. Loney, An Elementary Treatise on the Dynamics of a particle and of rigid bodies, Cambridge

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B. Sc (II)**		Program Code: **0855**
Name of the Course: **Computer Hardware**		Max Marks: **50**
Course Code: **0855**	Total Duration- **70 Hr**	(Internal: **10**+ External: **50**)

Course Objective:

1. To introduce the overall organization of the microcomputers.
2. To introduce the common peripheral devices used in computers.
3. To introduce the hardware components, use of microprocessor and function of various chips used in microcomputer.

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	Classification And Organization of Computers: Digital and analog computers and its evolution. Major components of digital computers.	14	10
	Memory addressing capability of CPU; word length and processing speed of computes		
	Microprocessors single chip microcomputers; large and small computers. Users interface Hardware software and firmware. multi programming multi user system.		
	Dumb smart and intelligent terminals computer network and multi-processing, LAN parallel processing		
	Flynn's classification of computers. Computer flow and data flow computers.		
2	Central Processing Unit. CPU organization, ALU control unit registers.	14	10
	Instructions for INTEL 8085, Instruction word size,		
	Various addressing mode		
	interrupts and exceptions, some special Control signals and I/O devices.		
	Instruction cycle fetch and execute operation, time Diagram, data flow.		
3	Memory Of Computers. Main memory secondary memory	14	10
	backup memory, cache memory.		
	real and virtual Memory Semiconductor memory		
	Memory controller and magnetic memory; RAM; disks, optical disks Magnetic bubble memory;		
	DASD, destructive and non-destructive. readout. Program of data Memory and MMU.		

4	I/O Devices.: I/O devices of micro controller; Processors I/O devices, printer, plotter, other output devices, I/O port serial data transfer scheme, Micro controller, signal processor, I/O processor I/O processor arithmetic processor.	14	10
5	System Software and Programming Technique. ML, AL, HLL, stack subroutine debugging of programs macro, micro programming, Program Design, software development flow & chart multi programming, multiuser, multi-tasking Protection, operating system and utility program, application package.	14	10

Course Outcome:

1. Identify the hardware components of a computer.
2. Lists the hardware components such as processor, memory, disk, main board, etc.
3. Explains the features (speed, capacity, etc.) of the hardware components of a computer.
4. Explains the relationships between the components of a computer and how data are transferred among the components.
5. identify the peripheral devices outside computer.

References:

1. Ray, A. K.; Bhurchand, K.M. Advanced Microprocessors and Peripherals. India: Tata McGraw-Hill.
2. PC Hardware: The Complete Reference
3. **Computer Fundamentals**
   Goel, Anita Pearson
4. **Computer Fundamentals: Architecture & Organization**
   Ram, B. 4th ed New Age
   Computer Fundamentals: Concepts, Systems & Applications Sinha, P. K. BPB
5. **Computer Fundamentals: Concepts, Systems & Applications**
   Sinha, P. K/ Sinha, P. 3rd ed BPB

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc. II**		Program Code: B.Sc. II
Name of the Course: **Computer Software**		Max Marks: **50**
Course Code: **0856**	Total Duration- **90 Hr**	Theory: **50**

Course Objective:

1. To introduce the internet & web related technology & learn the intricacies of web-page designing using HTML.
2. To take review or tour of Programming in C and make aware of limitation of C, thereby need of the origin of C++.
3. To impart knowledge in such a way that students should be able to use of concept of Object-Oriented Programming Approach in their programming skills.
4. To imbibe with the knowledge of implementation of various features of C++ i.e., concept of Object, Object communication, Encapsulation, Data hiding, overloading, inheritance, polymorphism etc.

Syllabus

UNIT	TOPIC	Duration (In Hours)	MARKS
1	Html Basics & Web Site Design Principles Concept of a Web Site, Web Standards, what is HTML? HTML Versions, Naming Scheme for HTML Documents, HML document/file, HML editor, Explanation of the Structure of the homepage, Elements in HIML Documents HML Tags, Basic Had Tags, Comment tag in HIM, Viewing the Source of a web page, how to download the web page source? XML, CSS, Extensible Markup Language 0), Extensible Style sheet language DS), Some tips for designing web page, HOM Document Structure. HTML Document Structure-Head Section, Illustration of Document Structure, <B> Element, <ISINDEX Element, LINK Element META, <TITLE> Element, <SUP> Element Practical Application, IN Document Structure-Body Section:-Body elements and its attributes: Background: Background Color: Text Link; Active Link 2000; Visited Link(VLINK), Visited Link, Left margin; Top margin, Organization of Elements in the Body of the document: Text Block Elements; Text emphasis Elements, Special elements - Hypertext Anchors, Character-Level Elements Character References, Text Block elements, HR Horizontal Line); Hn (Headings), P (Paragraphs); Lists; Address; Blockquote; Table; DIV (HTML 3.2 and up) PRE (Preformatted); FORM, Text Emphasis Elements, Special Elements - Hypertext Anchors, Character-Level Elements: line breaks (BR) and images(IMG), Lists, CHARACTER Emphasis Modes, Logical & Physical styles, Netscape, Microsoft and Advanced Standard Elements List, POT,	18	10

	BASEFONT and CENTER.		
2	Image, Internal and External Linking Between Webpages Netscape, Microsoft and Advanced Standard Elements List, POT, BASSPORT and CENTER Insertion of images using the element IMG (Attributes: SRC (Source), WIDTH, HEIGHT, ALT (Alterative), ALIGN), IMG (In-line Images), Element and attributes, Illustrations of IMG Alignment, Images as Hypertext Anchor, Internal and external linking between web pages hypertext anchors, HREF in Anchors, Links to a particular place in a document, NAME attribute in an anchor, Targeting NAME anchors, TITLE attribute, Practical IT Application Designing web pages links with each other.	18	10
3	Introduction To OOP Advantages of OOP, The Object-Oriented Approach, Characteristics of object - oriented language Object, Classes, Inheritance, reusability, Polymorphism and C++. Function: Function Declaration, calling Function, Function Define, Passing Argument to function, Passing Contact, Passing Value, Reference Agent, returning by reference, Inline function, Function Overloading, Default Arguments in function	18	10
4	Object Classes and Inheritance Object and Class, Using the class, class constructor, class destructors, object as function argument, copy constructor, struct and classes, array as class member, Static Class Data, Static Member Functions, Friend function, Friend class, operator overloading. Type of inheritance, base class, Derive class. Access Specifier: protected. Function Overriding, member function, string, Template Function.	18	10
5	Pointers And Virtual Function painters: & and operator pointer variables, pointer to pointer, void pointer. pointer and array, pointer and function, pointer and string, memory management, new and delete, pointer to object, this pointer Virtual Function; Virtual Function, Virtual member function, accesses with pointer, pure virtual function, File and Stream: C++ stream, C++ Manipulators, Stream class string I/0, char I/0 Object I/0, I/O with multiple object, Disk I/0	18	10

Course Outcome: Student will be able to

1. Able to know how to do programming in C++ environment.
2. Able to understand and implement the concepts of object-oriented approach using C++.
3. Able to acquire in depth knowledge and develop software in C++
4. identify different class attributes, member functions, base class and derived class and their relationships among them
5. learn how to reuse the code using polymorphism.

References:

1. Introduction to ICM: Kamlesh Agarwala, O.P. Vyas, Prateek & A. Agrawala (Kitab Mahal Publication)
2. Let us C++: Y. Kanetkar B.P.B. Publication
3. Programing in C++: E. Balaguruswami
4. Mastering in C++: Venu Gopal
5. Object Oriented Programing in C++: Lafore R, Galgotia Publications

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc. II**		Program Code: **B.Sc.** II
Name of the Course: **Physics (I) Thermodynamics, Kinetic Theory and Statistical Physics**		Max Marks: **50**
Course Code: **0843**	Total Duration- **90 Hr**	

Course Objective:

1. To understand the nature of concepts and laws of thermodynamics and entropy.
2. To understand the behavior of materials in low temperature.
3. To analyses thermal conductivity and black body radiation.
4. To understand the laws of statistical physics.

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	The laws of thermodynamics: The Zeroth law, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, Carnot's cycle, camot theorem, second law of thermodynamics. Clausius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (1) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Concept of entropy, Entropy of the universe. Entropy changes in reversible and irreversible processes, Entropy of Ideal gas, Entropy as a thermodynamic variable, S-T diagram, Principle of increase of entropy. The thermodynamic scale of temperature, Third law of thermodynamics, Concept of negative temperature.	18	10
2	Thermodynamic functions, Internal energy, Enthalpy, Helmholtz function and Gibb's free energy, Maxwell's thermodynamical equations and their applications, TdS equations, Energy and heat capacity equations Application of Maxwell's equation in Joule- Thomson cooling, adiabatic cooling of a system, Van der Waals gas, Clausius-Clapeyron heat equation. Blackbody spectrum, Stefan-Boltzmann law, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.	18	10

3	Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions mean free path and collision cross sections, estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure. Behaviour of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO; Gas. Critical Constants.	18	10
4	The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, y phase space and u phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy, Transition to quantum statistics, has a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator	18	10
5	Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose- Einstein and Fermi-Dirac Statistics, Limits of B-E and F-D statistics to M-B statistics Application of B-E statistics to black body radiation, Application of F-D statistics to free electrons in a metal.	18	10

Course Outcome: Students will be able to

1. Understand laws of thermodynamics and entropy.
2. Identify and understand the behavior of materials in low temperature
3. Apply the laws of thermodynamics along with necessary mathematics for solving problems.
4. Understand the laws of statistical physics.

References:

1. Unified Physics – R. P. Goyal
2. B.B. Laud, "Introduction to Statistical Mechanics" (MacMillan 1981)
3. F. Reif: "Statistical Physics" (McGraw-Hill, 1998),
4. K, Haung: "Statistical Physics" (Wiley Eastern, 1988).
5. Thermal and statistical Physics: R.K. Singh, Y.M. Gupta and S. Sivraman.
6. Statistical Physics: Berkeley Physics Course, Vol. 5
7. Physics (Part-2): Editor, Prof. B.P. Chandra, M.P. Hindi Granth Academy.
8. Heat and Thermodynamics: K.W. Zeemansky 8. Thermal Physics: B.K. Agarwal
9. Heat and Thermodynamics: Brij Lal and N. Subramanyam

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Department of Computer Science
Academic Year
2021-22
B.Sc. Second Year

Name of the Program: **B.Sc. II**		Program Code: **B.Sc. II**
Name of the Course: **Physics (II) (Waves, Acoustics Optics and Laser)**		Max Marks: **50**
Course Code: **0844**	Total Duration- **90 Hr**	

Course Objective:

1. To understand the natural behaviour of aberration in lens
2. To study the theory and experiment of interference using air wedge, Newton's rings and Michelson interferometer
3. To study the theory and experimental past of diffraction by Fresnel's and Fraunhoffer methods
4. To study the theories for production of polarization of light
5. To understand the basic principle of laser, characteristics and applications.

Syllabus

Unit	Topic	Duration (In Hours)	Marks
1	Repeated integrals of a function of more than one variable, definition of a double and triple integral. Gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, and their geometrical interpretation, line, surface and volume integrals, thus of a vector field. Gauss's divergence theorem, Green's theorem and Stokes's theorem and their physical significance Kirchhoff's law, Ideal Constant-voltage and Constant-current Sources. Thevenin theorem, Norton theorem, Superposition theorem Reciprocity theorem and Maximum Power Transfer theorem	18	10
2	Coulomb's law in vacuum expressed in Vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field Relation between Electric potential and Electric field, dipole in a uniform electric field and its energy, flux of the electric field. Gauss's law and its application E due to (1) an Infinite Line of Charge, (2) a Charged Cylindrical Conductor, (3) an Infinite Sheet of Charge and Two Parallel Charged Sheets, capacitance, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field.	18	10

3	Dielectric constant, Polar and Non-Polar dielectrics, Dielectrics and Gauss's Law, Dielectric Polarization, Electric Polarization vector P. Electric displacement vector D, Relation between three electric vectors, Dielectric susceptibility and permittivity. Polarizability and mechanism of Polarization, Lorentz local field. Claus Mosotti equation, Debye equation, Ferroelectric and Paraclectric dielectrics, Steady current, current density J, Eddy currents and continuity equation, rise and decay of current in L, CR and LCR circuits, decay constants, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel race, Q-factor, power consumed by an AC circuit, power factor	18	10
4	Magnetization Current and magnetization vector M. three magnetic vectors and their relationship, Magnetic permeability and susceptibility. Diamagnetic, paramagnetic and ferromagnetic substances. B.H. Curve, cycle of magnetization and hysteresis, Hysteresis loss, Biot-Savart's Law and its applications: B due to (1) a Straight Current Carrying Conductor and (2) Current Loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital law (Integral and Differential Forms).	18	10
5	Electromagnetic induction, Faraday's law, electromotive force, integral and differential forms of Faraday's law Mutual and self-inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.	18	10

Course Outcome: Students will be able to

1. Understand the natural behaviour of aberration in lenses
2. Understand the theory and experiment of interference using air wedge, Newton’s rings and Michelson interferometer
3. Understand the theory and experimental past of diffraction by Fresnel’s and Fraunhofer methods
4. Understand the theories for production of polarization of light
5. Understand the basic principle of laser, characteristics and applications in daily life.

References:

1. Berkeley Physics Course, Electricity and Magnetism, Ed. EM. Purcell (Mc Graw- Hill).
2. Halliday and Resnik, Physics, Vol. 2.
3. DJ Griffith, Introduction to Electrodynamics (Prentice-Hall of India).
4. Raitz and Milford, Electricity and Magnetism (Addison-Wesley).
5. AS Mahajan and AA Rangwala, Electricity and Magnetism (Tata Mc Graw-hill).
6. AM Portis, Electromagnetic fields.
7. Pugh & Pugh, Principles of Electricity and Magnetism (Addison-Wesley).
8. Panofsky and Phillips, Classical Electricity and Magnetism, (India Book House)
9. SS Atwood, Electricity and Magnetism (Dover).