



GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR
(Established by State Legislature Act 17 of 1995)
'A+' Grade, NAAC Accredited State Govt. University

Acad./AC-III/BOS&R-12/2024/ 2599
Dated: 12/6/24

To

The Controller of Examinations
GJUST, Hisar.

Sub: Approval of revised scheme of examination and syllabi of Integrated B.Sc. (Hons./Hons. with Research) – M.Sc. Physics (1st & 2nd semester) being run in University Teaching Department w.e.f. academic session 2023-24.

Sir,

In continuation to this office letter no. Acad./AC-III/BOS&R-33/2023/6293-6295 dated 27.10.2023 on the subject cited above.

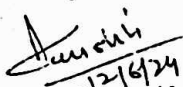
I am directed to inform you that the Vice-Chancellor, on the recommendations of Dean Academic Affairs and Chairperson concerned is pleased to approve the revised scheme of examinations and syllabi of Integrated B.Sc. (Hons./Hons. with Research) – M.Sc. Physics (1st & 2nd semester) being run in University Teaching Department w.e.f. academic session 2023-24.

A copy of the revised scheme of examinations & syllabi of above said programme is enclosed herewith.

You are therefore, requested to take further necessary action accordingly.

Yours faithfully

DA: As above


Assistant Registrar (Academic)
for Registrar

Endst. No. Acad./AC-III/BOS&R-12/2024/ 2600-2601

Dated: 12/6/24

A copy of the above is forwarded to the following for information and necessary action:-

1. Dean, Faculty of Physical Sciences & Technology, GJUST, Hisar.

2. Chairperson, Deptt. of Physics, GJUST, Hisar alongwith scheme of examinations and syllabi of Integrated B.Sc. (Hons./Hons. with Research) – M.Sc. Physics (1st & 2nd semester) being run in University Teaching Department w.e.f. academic session 2023-24. He is requested to arrange to upload the scheme of examinations & syllabi of above said programme on the website of the University.


Assistant Registrar (Academic)



Guru Jambheshwar University of Science and Technology
Hisar-125001, Haryana
(‘A+’ NAAC Accredited State Govt. University)



Scheme of Examination for Integrated Five Years Programme
(UG Four Years Programme (Multidisciplinary) (Single Major from Third Semester) + PG One Year Programme)

Name of the Programme: Integrated B.Sc. (Hons/Hons with Research)-M.Sc. Physics
According to National Education Policy-2020

FIRST YEAR

(For the Session 2023-24)

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SEMESTER-I								
Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hrs)
Discipline Specific Course	23CHE0101T	Chemistry-I	4	4	30	70	100	3
	23PHY0101T	Physics-I (Mechanics)	4	4	30	70	100	3
	23MAT0101T	Mathematics-I (Algebra)	4	4	30	70	100	3
Minor Course/ Vocational Course	23PHY0101P	Basic Instrumentation	2	4	15	35	50	3
Multidisciplinary Course	23MDC0103T	Elementary Biology-I (Fundamentals of Biology)	3	3	25	50	75	2.5
Ability Enhancement Course	23AEC0103T	English-I	2	2	15	35	50	2
Skill Enhancement Course	23SEC0103T	Basic Measurements in Physics	3	3	25	50	75	2.5
Value Added Course	23VAC0101T	Environmental Science-I	2	2	15	35	50	2
			24	26	185	415	600	
SEMESTER-II								
Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hrs)
Discipline Specific Course	23CHE0201T	Chemistry-II	4	4	30	70	100	3
	23PHY0201T	Physics-II (Heat & Thermodynamics)	4	4	30	70	100	3
	23MAT0201T	Mathematics-II (Calculus)	4	4	30	70	100	3
Minor Course/ Vocational Course	23CHE0201P	Physicochemical analysis and purification techniques	2	4	15	35	50	3
Multidisciplinary Course	23MDC0106T	Elementary Biology-II (Cell Biology)	3	3	25	50	75	2.5
Ability Enhancement Course	23AEC0102T	Hindi-II	2	2	15	35	50	2
Skill Enhancement Course	23SEC0105T	Fundamentals of Computers	3	3	25	50	75	2.5
Value Added Course	23VAC0103T OR 23VAC0104T	Yoga and Meditation OR Emotional Competence and Spirituality for well-being	2	2	15	35	50	2
			24	26	185	415	600	

Notes:

- (i) The Semester-I and Semester-II will be common for all the three Integrated B.Sc. (Hons/Hons with Research)-M.Sc. Chemistry/Physics/Mathematics Programme.
- (ii) The student opting for exit after first year must complete internship of 4 credits (120 Hrs) to get UG Certificate.

[Handwritten Signature]

[Handwritten Signature]
16/5/24
Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

DEPARTMENT OF CHEMISTRY
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR

Integrated B.Sc. (Hons/Hons. with research)-M.Sc. (Chemistry/Physics/Mathematics)
Integrated B.Sc. (Life Science)-M.Sc. (Biotechnology/Microbiology/Botany/Zoology)

CHEMISTRY-I

Paper code: 23CHE0101T

60 Hrs (4Hrs / week)

Credits:4

Time: ~~4 Hrs~~ 3 hrs

Marks for Major Test (External): 70

Marks for Internal Exam: 30

Total Marks: 100

Note: The examiner is requested to set nine questions in all, selecting two questions from each UNIT and one compulsory question (Question No.1 based on entire syllabus will consist of seven short answer type questions each of two marks). The candidate is required to attempt five questions in all selecting one from each UNIT and the compulsory Question No.1.

UNIT-I

Chemical Thermodynamics

11

15 Hrs

Objectives and limitations of Chemical Thermodynamics, state functions, thermodynamic equilibrium, work, heat, internal energy, enthalpy. First Law of Thermodynamics: First law of thermodynamics for open, closed and isolated systems. Reversible isothermal and adiabatic expansion/compression of an ideal gas. Irreversible isothermal and adiabatic expansion. Enthalpy change and its measurement, standard heats of formation and absolute enthalpies. Kirchoff's equation.

Second and Third Law: Various statements of the second law of thermodynamics. Efficiency of a cyclic process (Carnot's cycle). Entropy: Entropy changes of an ideal gas with changes in P, V, and T. Free energy and work functions. Gibbs-Helmholtz Equation, Criteria of spontaneity in terms of changes in free energy. Introduction to Third law of thermodynamics.

UNIT-II

Conductance and Electrochemistry

15 Hrs

Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance to measure degree of dissociation of weak electrolytes. Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half cell potentials, application of electrolysis in metallurgy and industry. Chemical cells with examples; Standard electrode (reduction) potential.

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UNIT-III

Fundamentals of Organic Chemistry

15 Hrs

Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.

UNIT-IV

Stereochemistry

8 Hrs

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; cis-trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

Chemistry of Biomolecules

7 Hrs

Occurrence, classification of Carbohydrates. Amino acids, peptides and their classification. α -Amino Acids. Zwitterions, pK values, isoelectric point, components of nucleic acids, nucleosides and nucleotides.

BOOKS SUGGESTED:

1. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
2. Castellan, G.W., Physical Chemistry, Narosa Publishers
3. Morrison, R. N. & Boyd, R. N. Organic Chemistry. Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
5. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.
7. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.
8. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.

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23PHY0101T: PHYSICS – I (MECHANICS)

Marks (Theory) : 70
Marks (Internal Assessment) : 30

Credits : 4 (60 lectures)
Time : 3 Hrs

Note: Paper setter is to set nine questions in all. Question no. 1 (compulsory based on the entire syllabus) will consist of seven short answer type questions, each of two marks. Rest of Eight questions is to be set uniformly selecting two questions from each Unit. A student is required to attempt five questions in all selecting one from each Unit and a compulsory question 1. The question paper shall contain 20% numerical problems in the relevant papers.

Course Objective: The objective of this course is to teach the students fundamentals of Newtonian Mechanics, rigid body dynamic, concept of inverse square force and the special theory of relativity.

Unit – I

Fundamentals of Dynamics: Reference frames, Inertial and non-inertial frames of references, Conservative and non-conservative forces, Fictitious forces, Concept of potential energy, Energy diagram. Stable and unstable equilibrium, Elastic potential energy, Force as gradient of potential energy, Work & Potential energy, Impulse, Centre of Mass for a system of particles, Motion of centre of mass (discrete and continuous), Expression for kinetic energy, Linear momentum and angular momentum for a system of particles in terms of centre of mass values.

Collisions: Elastic and inelastic collisions between particles, Centre of Mass and Laboratory frames.

Unit - II

Rotational Dynamics: Equation of motion of a rigid body, Rotational motion of a rigid body in general and that of plane lamina, Rotation of angular momentum vector about a fixed axis, Angular momentum and kinetic energy of a rigid body about principal axis, Torque, Principle of conservation of angular momentum, Moment of Inertia (discrete and continuous), Calculation of moment of inertia for rectangular, cylindrical and spherical bodies, Kinetic energy of rotation, Motion involving both translation and rotation, elementary Gyroscope.

Unit – III

Inverse Square Law Force: Forces in nature (qualitative), Central forces, Law of gravitation, Gravitational potential energy, Inertial and gravitational mass, Potential energy and force between a point mass and spherical shell, a point mass and solid sphere, gravitational and electrostatic self energy, two body problem and concept of reduced mass, Motion of a body under central force, Equation of orbit in inverse-square force field, satellite in Circular orbit & Geosynchronous orbits, Basic idea of GPS (Global Positioning System).

Unit – IV

Special Theory of Relativity: Michelson-Morley Experiment and its outcome, Galilean transformation (velocity, acceleration) and its inadequacy, Postulates of Special Theory of Relativity, Lorentz Transformations, simultaneity, Lorentz contraction, Time dilation, Relativistic transformation of velocity, frequency and wave number, Relativistic addition of velocities, Variation of mass with velocity, Massless Particles, Mass-energy Equivalence, Relativistic Doppler effect.

Relativistic Kinematics (decay, inelastic collision, Compton effect), Transformation of Energy, Momentum and force, Four Vectors.

P.T.O.

Reference Books:

1. An introduction to Mechanics, D. Kleppner, R.J. Kolenkow, 2007, McGraw-Hill.
2. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2012.
3. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
4. University Physics, F.W. Seers, M. W. Zemansky, H. D. Young, Addison-Wesley Pub. Co.
5. Fundamentals of Physics, Halliday, & Walker, Resnick John Wiley & Sons, Inc.

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Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

23MAT0101T: Mathematics-I (Algebra)

Semester: I
Credits: 4-0-0
Hours/Week: 4
Course Type: DSC

Marks (External) : 70
Marks (Internal) : 30
Maximum Marks(Total) : 100
Examination Duration: 3 Hrs

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit in addition to compulsory Question No. 1. All questions shall carry equal marks.

Course Outcomes: After completing this course, the learner will be able to :

- CO 1 Enables us to know about different type of matrices, their properties and applications.
- CO 2 To know about consistency of different linear using rank.
- CO 3 Enables us to get knowledge about relations between roots and coefficients of the polynomial.
- CO 4 To know about different methods to solve cubic equations also enables to know the nature of roots of a polynomial.

Unit-I

Symmetric, Skew-symmetric, Hermitian and skew Hermitian matrices. Elementary operations on matrices. Rank of a matrix. Inverse of a matrix. Linear dependence and independence of rows and columns of matrices. Row rank and column rank of a matrix. Eigenvalues, eigenvectors and the characteristic equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix.

Unit - II

Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.

Unit- III

Relations between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots. Common roots and multiple roots. Transformation of equations.

Unit - IV

Nature of the roots of an equation, Descartes's rule of signs. Solutions of cubic equations (Cardon's method). Biquadratic equations and their solutions.

Books Recommended :

1. H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications 1994.
2. Shanti Narayan, A Text Books of Matrices.
3. Chandrika Prasad, Text Book on Algebra and Theory of Equations. Pothishala Private Ltd., Allahabad.

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23PHY0101P: BASIC INSTRUMENTATION

Marks (External) : 35

Credits : 2

Marks (Internal Assessment): 15

Time : 4Hrs/week

Total Marks : 50

1. Each student should perform at-least eight experiments.
2. The students are required to calculate the error involved in a particular experiment.
3. List of experiments may vary.

List of Experiments:

1. Measurements of length (or diameter) using Vernier calliper, screw gauge and travelling microscope.
2. To determine the height of an object using a Sextant.
3. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine g and velocity for a freely falling body using Digital Timing Technique
6. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
7. To determine the Young's Modulus of a Wire by Optical Lever Method.
8. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
9. To determine the elastic Constants of a wire by Searle's method.
10. To determine the value of g using Bar Pendulum.
11. To determine the value of g using Kater's Pendulum.

Reference Books

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jbn M. Ogborn, 4th Edition reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Edn, 2011, Kitab Mahal
4. Engineering Practical Physics, S.Panigrahi& B.Mallick,2015, Cengage Learning India Pvt. Ltd.
5. Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.

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16/5/24
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Multidisciplinary Course

Subject Code	Subject Nomenclature	Credits
23MDC0103T	ELEMENTARY BIOLOGY-I (Fundamentals of Biology)	3+0

External Marks	50
Internal Marks	25
Total Marks	75
Time	3h

Note: Examiner will set the questions in all selecting two questions from each unit and one question of short answer/objective type covering the entire syllabus, which will be compulsory. Students will have to attempt five questions in all selecting one from each unit and the compulsory question. All questions will carry equal marks.

Learning Objectives

The objectives of this course are to sensitize the students to the fact that as we go down the scale of magnitude from cells to organelles to molecules, the understanding of various biological processes. The course shall make the students aware of various theories of origin of life and evolution

After successful completion of this course, students should be able to: -

Learn about biomolecule, prokaryotic and eukaryotic cell and cell organelles, cell membrane and transport across the membrane, cell division

Understand origin of life and various theories of evolution and documentary evidence

UNIT-I

Molecules of Life: pH and Buffers in Biology. Chemistry of water. Chemical Bonding and various types of bonds. Carbohydrate: Sugars and polysaccharides. Lipids: Fat, phospholipids and steroids. Proteins: polypeptides, protein confirmation and function. Nucleic acids as information molecules. DNA and RNA' Lectures: 15

UNIT-II

Cell Structure and Cell Processes: Prokaryotic cells and eukaryotic cells Organelles of eukaryotic cell: Nucleus, endoplasmic reticulum. Golgi apparatus, vesicles, peroxisomes, Mitochondria and Plastid. The evolution of eukaryotic organelles. Lectures: 10

UNIT-III

Membranes as Fluid Layers of Lipid: The phospholipids bilayer. The fluid mosaic model. Model Membranes Membrane proteins. Passive transport across membranes: Diffusion, facilitated diffusion, Osmosis. Active transport Lectures: 10

UNIT-IV

Origin of Life and Evolution: Different theories of origin of life. Experimental evidences supporting different theories. Lamarck, Darwinism and other theories of evolution, Documentary evidences supporting different evolution theories. Lectures: 15

Recommended Textbooks and References:

1. Campbell, N.A. & Reece, J. B. *Biology (12th Ed.)*. Pearson Benjamin Cummings, San Francisco. 2020.
2. Raven, P., Johnson, G., Mason, K., Losos, J. & Duncan, T. *Biology (12th Ed.)* Tata McGraw Hill Publications, New York. US. 2020.

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ENGLISH-I

Paper code: 23AEC0103T

Credits: 2

External Marks : 35

Internal Marks: 15

Total Marks: 50

Note: The examiner is requested to set nine questions in all, selecting two questions from each UNIT and one compulsory question (Question No.1 based on entire syllabus will consist of seven short answer type questions each of ^{one} two marks). The candidate is required to attempt five questions in all selecting one from each UNIT and the compulsory Question No.1.

UNIT-I

Syntax

7Hrs

Sentence structures, Verb patterns and their usage.

UNIT-II

Phonetics

8Hrs

Basic Concepts – Vowels, Consonants, Phonemes, Syllables; Articulation of Speech Sounds – Place and Manner of Articulation; Transcription of words and simple sentences, using International Phonetic Alphabet.

UNIT-III

Comprehension

7Hrs

Listening and Reading comprehension – Note taking, Reviewing, Summarising, Interpreting, Paraphrasing and Précis Writing.

UNIT-IV

Composition

8Hrs

Descriptive, Explanatory, Analytical and Argumentative Writing - description of simple objects like instruments, appliances, places, persons, principles; description and explanation of processes and operations; analysis and arguments in the form of debate and group discussion.

BOOKS SUGGESTED:

1. Roy A. & Sharma P.L. English for Students of Science, Orient Longman.
2. Spoken English for India by R.K. Bansal and J.B. Harrison, Orient Longman.
3. Tickoo M.L. & Subramanian A.E. Intermediate Grammar, Usage and Composition, Orient Longman.
4. Pink M.A. & Thomas S.E. English Grammar, Composition and Correspondence, S. Chand and Sons Pvt.Ltd., Delhi.
5. Thomson & Martinet A Practical English Grammar, OUP, Delhi.
6. Hornby A.S Guide to Patterns and Usage in English, OUP, Delhi.
7. Balasubramanian T. A Textbook of English Phonetics for Indian Students, MacMillan, Chennai.
8. O'Connor J.D. Better English Pronunciation, Cambridge Univ. Press, London.
9. McCarthy English Vocabulary In Use, Foundation Books (Cambridge University Press), Delhi.
10. Buck, Assessing Listening, Foundation Books (Cambridge University Press), Delhi.

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Crakman
Department of English
Guru Jambheshwar University
of Science & Technology
Hisar-125001

23SEC0103T: BASIC MEASUREMENTS IN PHYSICS

Marks (Theory) : 50

Credits : 3

Marks (Internal Assessment) : 25

Time : 3 Hrs

Course Objective: This course is of experimental and tutorial nature. This course aims to cover the fundamental principles involved in the methods of measurement in the experimental physics through laboratory and tutorials. The focus is on the teaching undergraduate students about direct and indirect methods of accurate measurements of fundamental physical quantities.	Course Outcomes: After completion of this course, students will be familiar with the methods of measurement in the experimental physics.
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UNIT – I

Measurements: Accuracy and precision, Sources of uncertainty and experimental errors, Concepts of standards, traceability and calibration, Basic of Statistical analysis of data and curve fitting, Measurement of Length: Calipers, Micrometre, Dial indicator, Triangulation technique, Theodolite, Range Finder.

Measurement of Angles and Arc: Inclinometers and laser levellers, Auto collimator, Angular Encoders
Measurement of Time: Oscillator and Clocks

UNIT – II

Transducers and its characteristics: Selection of instrumentation transducers, Modeling a transducer with typical example of electrical parameter measurements like current, voltage, resistance and capacitance, DC and AC Bridge Measurements, Strain gauge and Wheatstone Bridge, Gas and liquid thermometer, Thermoelectric Sensors: Resistance Temperature Detectors (RTD), Thermistor, Thermocouples, Linear variable differential transformer (LVDT), Capacitance change transducers.


UNIT – III

Spectroscopic Instruments: Prism Spectrometers and Grating spectrometer, Measurement of refractive index and dispersion, Measurements with Fresnel Bi Prism, Measurements and Newton's rings, Triangulation techniques using laser and its applications.

Other measurements: Measurement of flow of liquid and gases, Measurement of Pressure, Vacuum gauges

Reference Books

- 1) Measurement, Instrumentation and Experiment Design in Physics and Engineering, M. Sayer and A. Mansingh, PHI Learning Pvt. Ltd.
- 2) Experimental Methods for Engineers, J.P. Holman, McGraw Hill
- 3) The Physics of Metrology, Alexius J. Hebra, Springer 2010


Chairperson
Department of Physics
Guru Jambheshwar University
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Environmental Science-I
23VAC010iT

Credit:2

Total Marks:50
External Marks:35
Internal Marks:15

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of seven short answer type questions each of one marks. The remaining eight questions are to be set uniformly having two questions from each unit. The students are required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

Unit 1: Multidisciplinary nature of environmental studies

Definition, scope and importance; Need for public awareness.

Unit 2: Ecosystems • Concept of an ecosystem.

Structure and function of an ecosystem: Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).


Unit 3: Biodiversity and its Conservation

Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical Classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 4: Environmental Pollution

Definition

Cause, effects and control measures of:- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.


17/08/2021
Chairperson
Deptt. of Env. Sc. & Engg.
GJUS&T, HISAR-125001

DEPARTMENT OF CHEMISTRY
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR

Integrated B.Sc. (Hons/Hons. with research)-M.Sc. (Chemistry/Physics/Mathematics)
Integrated B.Sc. (Life Science)-M.Sc. (Biotechnology/Microbiology/Botany/Zoology)
CHEMISTRY-II

Paper code: 23CHE0201T

60 Hrs (4Hrs / week)

Credits: 4

Time: 3 Hrs

Marks for Major Test (External): 70

Marks for Internal Exam: 30

Total Marks: 100

Note: The examiner is requested to set nine questions in all, selecting two questions from each UNIT and one compulsory question (Question No.1 based on entire syllabus will consist of seven short answer type questions each of two marks). The candidate is required to attempt five questions in all selecting one from each UNIT and the compulsory Question No.1.

UNIT-I

Chemical Bonding and Molecular Structure

15 Hrs

Introduction to Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, polarizing power and polarizability

Introduction to Covalent bonding: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Ionic Solids: Factors affecting the formation of ionic solids, concept of close packing, radius ratio rule and coordination number. Calculation of limiting radius ratio for tetrahedral and octahedral sites. Structures of some common ionic solids NaCl, ZnS (zinc blende and wurtzite).

UNIT-II

Acids and Bases

8 Hrs

Brönsted-Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept. Hard and soft acids and bases (HSAB concept), applications of HSAB process.

Basic Coordination Chemistry

7 Hrs

Coordinate Bond. Werner's coordination theory, ligands, chelates. Nomenclature of coordination compounds. Stereochemistry of different coordination numbers, isomerism. Valence-bond and crystal field theories of bonding in complexes. Explanation of properties such as geometry colour and magnetism.

UNIT-III

Chemical Kinetics and Catalysis

15 Hrs

Rates of reactions, rate constant, order and molecularity of reactions. Differential rate law and integrated rate expressions for zero, first, second and third order reactions. Half-life time of a

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reaction. Methods for determining order of reaction. Effect of temperature on reaction rate and the concept of activation energy.

Catalysis: Homogeneous catalysis, Acid-base catalysis and enzyme catalysis. Heterogeneous catalysis.

UNIT-IV

Basics of spectroscopy

15 Hrs

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law. Electromagnetic radiations, Introduction to ultraviolet, visible and infrared spectroscopy, electronic transitions, λ_{\max} & ϵ_{\max} , chromophore, auxochrome, bathochromic, hypsochromic shifts. Infrared radiation and types of molecular vibrations, functional group and fingerprint region.

BOOKS SUGGESTED:

1. Cotton F.A. and Wilkinson G., Murillo C.A., Bochmann M., Advanced Inorg. Chemistry, 6th Edition, Pubs: John Wiley & Sons. Inc., 1999.
2. Lee J.D., Concise Inorganic Chemistry, 4th edition, Pubs: ELBS, 1991.
3. Huheey J.E., Keiter E.A., Keiter R.L., Inorganic Chemistry: Principles of Structures and Reactivity; 4th Edition, Pubs: Harper Collins, 1993.
4. Greenwood N.N. and Earnshaw A., Chemistry of the Elements, 2nd edition., Pubs: Butterworth/Heinemann, 1997.
5. Douglas B., Daniel D. Mc and Alexander J., Concepts of Models of Inorganic Chemistry, Pubs: John Wiley, 1987.
6. Puri B.R., Sharma L. R. and Pathania M. S., Principles of Physical Chemistry, Pubs: Vishal Publishing Company, 2003.
7. Laidler K. J Chemical Kinetics, McGraw Hill.
8. Castellan G.W. Physical Chemistry, Narosa Publishers
9. Kemp W. Organic Spectroscopy

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23MAT0201T: Mathematics-II (Calculus)

Semester: II
Credits: 4-0-0
Hours/Week: 4
Course Type: DSC

Marks (External) : 70
Marks (Internal) : 30
Maximum Marks(Total) : 100
Examination Duration: 3 Hrs

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to that eight more questions will be set, two questions from each unit. The students shall be required to attempt five questions in all selecting one question from each unit in addition to compulsory Question No. 1. All questions shall carry equal marks.

Course Outcomes: After completing this course, the learner will be able to :

CO1: Be able to compute limits, derivatives, and integrals. To be able to find higher order derivatives and utilize the Leibnitz rule to solve problems involving such derivatives.

CO2: Use the concept and principles of differential calculus to discover the curvature, concavity, and points of inflection, as well as asymptotes in Cartesian and polar coordinates.

CO3: Be able to trace standard curves in cartesian, parametric and polar coordinates. Derive Reduction formulae for some complex integrations.

CO4: Understand how to determine the arc length of a curve. Be able to determine the volume of a solid of revolution using multiple approaches.

Unit – I

Definition of the limit of a function. Basic properties of limits, Continuous functions and classification of discontinuities. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

Unit – II

Asymptotes in Cartesian coordinates, intersection of curve and its asymptotes, asymptotes in polar coordinates. Curvature, radius of curvature for Cartesian curves, parametric curves, polar curves. Newton's method. Tests for concavity and convexity. Points of inflexion. Multiple points. Cusps, nodes & conjugate points.

Unit – III

Tracing of curves in Cartesian, parametric and polar co-ordinates. Reduction formulae. Rectification: Fundamental theorem. Cartesian curves, parametric curves, polar curves. intrinsic equations of curve.

Unit – IV

Quadrature Sectorial area. Area bounded by closed curves. Volumes of solids of revolution: Volume formula for Cartesian curves, parametric curves, polar curves, Volume formula for two solids.

Books Recommended:

1. Differential and Integral Calculus, Shanti Narayan.
2. Murray R. Spiegel, Theory and Problems of Advanced Calculus. Schaun's Outline series. Schaum Publishing Co., New York.
3. N. Piskunov, Differential and Integral Calculus. Peace Publishers, Moscow.
4. Gorakh Prasad, Differential Calculus. Pothishasla Pvt. Ltd., Allahabad.
5. Gorakh Prasad, Integral Calculus. Pothishala Pvt. Ltd., Allahabad.

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15/5/24

23PHY0201T: PHYSICS-II (HEAT AND THERMODYNAMICS)

Marks (Theory): 70

Credits: 4 (60 lectures)

Marks (Internal Assessment): 30

Time: 3 hrs

Note: Paper setter is to set nine questions in all. Question no. 1 (compulsory based on the entire syllabus) will consist of seven short answer type questions, each of two marks. Rest of Eight questions is to be set uniformly selecting two questions from each Unit. A student is required to attempt five questions in all selecting one from each Unit and a compulsory question 1. The question paper shall contain 20% numerical problems in the relevant papers

Course Objective: The course on thermal physics is framed with the objective that students are able to understand basic concepts of thermodynamical systems. Students will be able to understand heat, work, temperature, entropy and the laws of thermodynamics. Behavior of real gases as thermodynamical systems has also been included.

UNIT - I

Zeroth and First Law of Thermodynamics: Extensive and intensive thermodynamic variables, Thermodynamic equilibrium, zeroth law and Concept of Temperature, Work and heat, State functions, First law of thermodynamics, Internal energy, Applications of first law, General relation between C_p and C_v , Work done during isothermal and adiabatic processes.

Second Law of Thermodynamics: Reversible and Irreversible process with examples, Conversion of Work into Heat and Heat into Work, Heat Engines, Carnot's Cycle, Carnot engine & its efficiency, Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence, Carnot's Theorem.

UNIT-II

Entropy and Third law of Thermodynamics: Concept of entropy, Clausius theorem, Clausius inequality, Second Law of Thermodynamics in terms of Entropy, Entropy of a Perfect Gas and Universe, Entropy Changes in Reversible and Irreversible Processes, Principle of Increase of Entropy, Third Law of Thermodynamics, Unattainability of absolute zero, T-S Diagrams, Phase Change, Classification of Phase Changes.

UNIT-III

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables; Internal Energy; Definition, importance, properties and applications of Chemical Potential, Enthalpy, Gibbs function and Helmholtz function.

Maxwell's Thermodynamic Relations: Derivations of Maxwell's Relations and their applications: (1) Clausius-Clapeyron equation (2) C_p - C_v value, (3) Energy equations (4) Change of temperature during adiabatic process.

UNIT-IV

Real gases: Behavior of Real Gases, Deviations from the Ideal Gas Equation. The Virial Equation, Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas, Boyle Temperature, Van-der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves, P-V Diagrams, Joule's Experiment, Free Adiabatic Expansion of a Perfect Gas.

Thermo-electricity: Seebeck effect, Peltier effect, Thomson effect and their explanations.

Reference Books:

1. A Treatise on Heat: Meghnad Saha and B.N. Srivastava, Indian Press
2. Thermal Physics: S. Garg, R. Bansal and Ghosh, Tata McGraw-Hill
3. Concepts in Thermal Physics: S.J. Blundell and K.M. Blundell, Oxford University Press
4. Heat and Thermodynamics: An Intermediate Textbook by M. W. Zemansky and R. Dittman, McGraw-Hill.

AA
16/5/24
Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

DEPARTMENT OF CHEMISTRY
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR

Integrated B.Sc. (Hons/Hons. with research)-M.Sc. (Chemistry/Physics/Mathematics)
Integrated B.Sc. (Life Science)-M.Sc. (Biotechnology/Microbiology/Botany/Zoology)
Physicochemical analysis and purification techniques

Paper code: 23CHE0201P

60 Hrs (4Hrs / week)

Credits: 2

Time: 3 Hrs

Marks for Major Test (External): 35

Marks for Internal Exam: 15

Total Marks: 50

1. Redox titrations: Determination of Fe^{2+} , $\text{C}_2\text{O}_4^{2-}$ (using KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$)
2. Iodometric titrations: Determination of Cu^{2+} (using standard hypo solution).
3. Complexometric titrations: Determination of Mg^{2+} , Zn^{2+} by EDTA.
4. Paper Chromatography: Qualitative Analysis of any one of the following Inorganic cations and anions by paper chromatography (Pb^{2+} , Cu^{2+} , Ca^{2+} , Ni^{2+} , Cl^- , Br^- , I^- and PO_4^{3-} and NO_3^-).
5. To determine the surface tension of at least two liquids using stalagmometer by drop no. and drop weight methods (Use of organic solvents excluded).
6. To determine the viscosity of at least two liquids by using Ostwald's viscometer (use of organic solvents excluded).
7. To determine the specific refractivity of at least two liquids.
8. Determine rate constant of acid catalyzed hydrolysis of methyl acetate.
9. To study the process of (i) sublimation (ii) Crystallization of camphor and phthalic acid
10. Preparation and purification through crystallization or distillation and ascertaining their purity through melting point or boiling point
 - (i) Iodoform from ethanol (or acetone)
 - (ii) p-Bromoacetanilide from acetanilide
11. The preliminary examination of physical and chemical characteristics (physical state, colour, odour and ignition test), extra element detection (N, S, Cl, Br and I).

BOOKS SUGGESTED:

1. Vogel A. I., Tatchell A.R., Furnis B.S., Hannaford A.J., Smith P.W.G., Vogel's Text Book of Practical Organic Chemistry, 5th Edn., Pubs: ELBS, 1989.
2. Pavia D.L., Lampanana G.M., Kriz G.S. Jr., Introduction to Organic Laboratory Techniques, 3rd Edn., Pubs: Thomson Brooks/Cole, 2005.
3. Mann F.G., Saunders P.C., Practical Organic Chemistry, Pubs: Green & Co. Ltd., London, 1978.
4. Svehla, G., Vogel's Qualitative Inorganic Analysis (revised); 7th edition, Pubs: Orient Longman, 1996.
5. Bassett, J., Denney, R.G., Jeffery, G.H., Mendham, J., Vogel's Textbook of Quantitative Inorganic Analysis (revised); 4th edition, Pubs: Orient Longman, 1978.
6. Yadav J. B., Advanced Practical physical Chemistry.

Som

Multidisciplinary Course

Subject Code	Subject Nomenclature	Credits
23MDC0106T	ELEMENTARY BIOLOGY-II (CELL BIOLOGY)	3+0

External Marks	50
Internal Marks	25
Total Marks	75
Time	3h

Note: Examiner will set nine questions in all, selecting two questions from each unit and one question of short answer/objective type covering the entire syllabus, which will be compulsory. Students will have to attempt five questions in all, selecting one from each unit and the compulsory question. All questions will carry equal marks.

Learning Objectives

- To understand the detailed overview of prokaryotic and eukaryotic cell and its inner components.
- To understand the cell membrane and processes of cell transport across membrane, protein synthesis, processing and trafficking.

Learning outcomes

- Learn cell and cell organelles, cell membrane and transport across the membrane, cell division.
- They will learn brief overview about cell signalling, cell communication, oncogene and Tumour suppressor gene.

UNIT-I

Cell: Introduction and classification of organisms by cell structure, cytosol, Lectures: 13 compartmentalization of eukaryotic cells, cell fractionation. Cell Membrane and Permeability: Chemical components of biological membranes, organization and Fluid Mosaic Model, membrane as a dynamic entity, cell recognition and membrane transport.

UNIT-II

Membrane Vacuolar system, cytoskeleton and cell motility: Structure and function of Lectures: 12 microtubules, Microfilaments, Intermediate filaments. Endoplasmic reticulum: Structure, function including role in protein segregation. Golgi complex: Structure, biogenesis and functions including role in protein secretion.

UNIT-III

Lysosomes: Vacuoles and Microbodies: Structure and functions Ribosomes: Structures and Lectures: 12 function including role in protein synthesis. Mitochondria: Structure and function, Genomes, biogenesis. Chloroplasts: Structure and function, genomes, biogenesis Nucleus: Structure and function, chromosomes and their structure. Cell division

UNIT-IV

Extracellular Matrix: Composition, molecules that mediate cell adhesion, membrane Lectures: 13 receptors for extra cellular matrix, macromolecules, regulation of receptor expression and function. Signal transduction. GPCR and Protein Kinase receptor, Cancer: Carcinogenesis, agents promoting carcinogenesis, characteristics and molecular basis of cancer.

Recommended Textbooks and References:

1. Karp, G. 2016. *Cell and Molecular Biology: Concepts and Experiments*. 7th Edition. John Wiley & Sons. Inc.
2. Alberts, Johnson, Lewis, Rafe, Roberts, Walter 2016 *Molecular biology of the cell* 5th edition
3. Cooper, G.M. and Hausman, R.E. 2016. *The Cell: A Molecular Approach*. 6th edition.
4. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Becker, W.M., Kleinsmith, L.J., Hardin, J. and Bertoni, G. P. 2016. *The World of the Cell*. 8th edition. Pearson Benjamin Cummings Publishing, San Francisco.
6. Campbell, N.A. and Reece, J. B. (2018) *Biology* 11th edition, Pearson Benjamin Cummings, San Francisco.

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गुरु जम्भेश्वर विज्ञान एवं प्रौद्योगिकी विश्वविद्यालय, हिसार
23AEC0102T

पेपर/कोर्स का नाम: Hindi-II

कोर्स कोड- 23AEC0102T

कुल अंक 50

लिखित परीक्षा: 35

Credit-2

आंतरिक मूल्यांकन- 15

समय: 1.5 घंटा (डेड घंटा)

कार्यक्रम प्रतिफल: (Programme Outcomes):

हिंदी भाषा को गहराई से तथा तर्कसंगत तथ्यों के साथ समझने के लिए क्रिटिकल रीडिंग महत्वपूर्ण और मददगार होती है। इस कोर्स के माध्यम से विद्यार्थी साहित्यिक चातुर्य सामग्री को विश्लेषणात्मक और व्याख्यात्मक तरीके से समझने का प्रयास करेंगे। यह पाठ्यक्रम हिंदी से इतर अन्य सभी विभिन्न विषयों में अध्ययनरत विद्यार्थियों को हिंदी साहित्य हिंदी भाषा का व्यापक तरीके से पढ़ने, समझने एवं विद्यार्थियों में आलोचनात्मक दृष्टि विकसित करने का अवसर प्रदान करेगा। यह पाठ्यक्रम विद्यार्थियों की योग्यता संवर्द्धन में मददगार होगा।

आवश्यक निर्देश: (पेपर सेटर एवं विद्यार्थियों के लिए)

1 पूरा पाठ्यक्रम दो खंडों में विभाजित है। लिखित परीक्षा 35 अंकों की होगी। 15 अंक इंटरनल के होंगे।

2 पाठ्यक्रम में निर्धारित विषय वस्तु के दोनों भागों/खंडों से प्रश्न पूछे जाएंगे। प्रत्येक खंड से 5-5 अंकों के 10 प्रश्न आलोचनात्मक / व्याख्या संबंधी एवं समीक्षात्मक प्रश्न पूछे जाएंगे। प्रत्येक प्रश्न 5 अंक का होगा। जिनमें से विद्यार्थी को किन्हीं सात (7) प्रश्नों के उत्तर देने होंगे। मूला प्रश्न पत्र 7x5= कुल 35 अंकों का होगा।

पाठ्यक्रम विषय वस्तु:

खंड एक- 1

जनसंचार माध्यम और हिंदी :

- 1 हिंदी के विविध रूप- राष्ट्रभाषा, राजभाषा माध्यम भाषा, संचार भाषा, सृजनात्मक भाषा मातृभाषा
- 2 जनसंचार माध्यमों का स्वरूप- मुद्रण, श्रव्य, दृश्य-श्रव्य, इंटरनेट
- 3 विज्ञापन लेखन
- 4 फीचर लेखन
- 5 रिपोटार्ज लेखन

खंड- दो- 2

निबंध लेखन:

- 1 हिंदी निबंध का उद्भव और विकास
- 2 निबंध लेखन से अभिप्राय
- 3 हरिश्चंद्र पर साई कृत निबंध- सदाचार का ताबीज
- 4 भारतेन्दु हरिश्चंद्र कृत निबंध-स्वर्ग में विचार सभा का अधिवेशन
- 5 निम्नलिखित विषयों पर निबंध लिखें।
 - राष्ट्रीय चेतना
 - भारत की सांस्कृतिक विरासतें
 - कंप्यूटर का उपयोग और महत्व
 - पर्यावरण संरक्षण और गुरु जम्भेश्वर जी का योगदान
 - भूमंडलीकरण
 - इक्कीसवीं सदी का भारत

अध्ययन हेतु पाठ्य सामग्री/ संदर्भित पुस्तकें :

- 1 जनसंचार माध्यम-डॉ प्रभाकर मायवे
- 2 जनसंचार माध्यमों का विकास और प्रभाव-डॉ अशोक कुमार मिश्रा
- 3 जनसंचार माध्यम भाषा और साहित्य- सुधीश पचौरी
- 4 हिंदी विज्ञापनों का पहला दौर-आशुतोष पार्थिवर
- 5 विज्ञापन की दुनिया- कुमुद शर्मा
- 6 विज्ञापन और जनसंपर्क- डॉ भुक्तिनाथ झा, सुधीशु श्रीवास्तव
- 7 विज्ञापन बाजार और हिंदी-कैलाशनाथ पांडे
- 8 फीचर लेखन-पीसी आर्य
- 9 फीचर लेखन स्वरूप और शिल्प-मनोहर प्रभाकर
- 10 निबंध श्रृंखला-डॉ श्याम शरण

Incharge
Dept. Of Hindi
GUJ S&T, Hissar

21/05/2024

23SEC0105T: FUNDAMENTALS OF COMPUTERS

External Marks: 50
Internal Marks: 25
Total Marks: 75
Credits: 3
Time: 3H

Note: Examiner will set nine questions in all, selecting two questions from each unit and one question of short answer/objective type covering the entire syllabus, which will be compulsory. Students will have to attempt five questions in all selecting one from each unit and the compulsory question. All questions will carry equal marks.

Course Objectives	Student Learning Outcomes
The objectives of this course are:- <ul style="list-style-type: none">- Students should learn basic principles of using Windows operation system.- Identify and analyse computer software, and networks components.- Read the fundamentals and basics of programming languages.	After successful completion of this course, students should be able to:- <ul style="list-style-type: none">- Develop an intuitive sense of how computers work and how they can be used to design programming to make academic and research work more efficient.- Students will be able to identify use of computer and information technology in biological sciences.

11

UNIT-I

An Overview of Computer System

(8 Lectures)

Anatomy of a Digital Computer, Memory UNITS, Main and Auxiliary Storage Devices, Input Devices, Output Devices, Classification of Computers. Radix number system: Decimal, Binary, Octal, Hexadecimal numbers and their inter-conversions; Representation of information inside the computers.

UNIT-II

Operating System Basics

(7 Lectures)

The user Interface, Running Programmes, managing files, Introduction to PC, Operating Systems: Unix/Linux, DOS, Windows 2000.

UNIT-III

Internet Basics

(7 Lectures)

Introduction to the basic concepts of Networks and Data Communications, How Internet Works, Major Features of Internet, Emails, FTP, using the Internet

UNIT-IV

Programming Languages

(8 Lectures)

Machine- Level- Language, Assembly- Level- Language, High Level- Language, Assembler, Compiler, Interpreter, Debuggers, Programming fundamentals: problem definition, algorithms, flow charts and their symbols, Introduction to Compiler, Interpreter, Assembler, Linker and Loader and their inter relationship.


Chairperson
Deptt of C.S.E.
GJU S&T, HISAR

23/5/24

23VAC0103T - Yoga and Meditation

Course Code	Subject	Teaching hrs/Week	
		L-T-P	Credits
23VAC0103T	Yoga and Meditation	2-0-0	2

Course Assessment Methods (Total Marks: 50=External 35+ Internal 15): The course contents of the courses with 02 credits is distributed among 2 units and the maximum marks assigned are 50 (35 external + 15 internal). 15 internal marks will be measured as per University ordinance.

Instruction for paper setting:

The maximum time duration for attempting the paper is 2 hours. The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to that four more questions will be set, two questions from each unit. The students shall be required to attempt three questions in all selecting one question from each unit consisting of 10 marks each in addition to compulsory Question No.1. Question paper will be in both English and Hindi languages.

Course Objectives & Course Outcomes

Sr. No.	At the end of semester, student will be able:
CO 1	To explain Yoga and its importance in Indian Philosophy.
CO2	To explain brief origin and history of Yoga and essentials of Yoga.
CO3	To appreciate the Yogic way of living, which can be inculcated in the life style.
CO4	To instill the effects of Yoga and Meditation as a part of lifestyle for wellbeing and positivity.

Course Content पाठ्यक्रम अन्तर्वस्तु

Unit-I: Fundamentals of Yoga

- Yoga: Meaning, Definition, Aim, Objectives & Misconceptions.
- Yoga: Its Origin, history and development of Yoga.
- Importance of Yoga in modern era.

इकाई-I: योग के मूलसिद्धांत

- योग: अर्थ, परिभाषा, लक्ष्य, उद्देश्य और ग्राह्यता।
- योग: योग की उत्पत्ति, इतिहास और विकास।
- आधुनिक युग में योगकामहत्व।

Unit-II: Essentials of Yoga Practices

- Place, Timing & Diet for Yoga Sadhana.
- Disciplines and failures in Yoga sadhana.
- Swasthavritta Vijyana (Science of healthy lifestyle).

इकाई-II: योगाभ्यास की अनिवार्यताएँ

- योगसाधना के लिए स्थान, समय और आहार।
- योगसाधना में साधकतत्त्व और बाधकतत्त्व।
- स्वस्थवृत्तविज्ञान (स्वस्थ जीवन शैलीका विज्ञान)।

Unit-III: Ashtanga Yoga

- Ashtanga Yoga: Yama (Social ethics), Niyama (Personal ethics), Asana (Physical postures), Pranayama (Breath control) and Pratyahara (Withdrawal of senses), Dharana (Concentration) Dhyana (Meditation) and Samadhi (Self-realization).

इकाई-III: अष्टांग योग

- अष्टांग योग: यम (सामाजिक नैतिकता), नियम (व्यक्तिगत नैतिकता), आसन (शारीरिक मुद्राएं), प्राणायाम (स्वसनपर नियंत्रण) और प्रत्याहार (इंद्रियों पर नियंत्रण), धारणा (एकाग्रता), ध्यान (एकाग्रता में निरंतरता) और समाधि (आत्म-साक्षात्कार)।

Unit-IV: Meditation

- Meditation: Meaning, Definition, Aim, Objectives & Misconceptions.
- Sthula(gross/physical) and Sukshma (subtle) Meditation.
- Importance of Meditation for Holistic Health (physical, mental and spiritual).

इकाई-IV: ध्यान

- ध्यान: अर्थ, परिभाषा, लक्ष्य, उद्देश्य और प्राप्ति।
- स्थूल (स्थूल/भौतिक) और सूक्ष्म (सूक्ष्म) ध्यान।
- समग्र स्वास्थ्य (शारीरिक, मानसिक और आध्यात्मिक) के लिए ध्यानकामहत्त्व।

Reference books:

- Foundation of Yoga, S.P. Singh and Yogi Mukesh, Standard Publication, New Delhi.
- Yoga Sutras of Patanjali by Swami Satyananda Saraswati, Yoga Publication Trust, Munger, Bihar.
- Vijnananand Saraswati-YogVijyan, Yoga Niketan Trust, Rishikesh.
- Asana, Pranayama, Mudra, Banda, by Swami Satyananda Saraswati. Yoga Publication Trust, Munger, Bihar.
- Meditation and Its Methods, Swami Vivekpananda, Sanage Publishing House,
- Concentration and Meditation by Swami ShivanandaSaraswati, Yoga Publication Trust, Munger, Bihar.
- Hatha Yoga Pradipika-Swami SatyanandaSaraswati, Yoga Publication Trust, Munger, Bihar.
- Hatha Pradipika- Swami Kuvalyanand, Kaivalyadham, Lonavala.
- GherandSamhita- Swami NiranjanaandaSaraswati, Yoga Publication Trust, Munger, Bihar.
- GherandSamhita- Swami Digambaranand, Kaivalyadham, Lonavala.

सहायकग्रंथ:

- फाउंडेशन ऑफ योग, एस.पी. सिंघ और योगी मुकेश, स्टैंडर्ड पब्लिकेशन, नई दिल्ली।
- पतंजलि के योगसूत्र, स्वामी सत्यानंद सरस्वती, योगप्रकाशन ट्रस्ट, मुंगेर, बिहार द्वारा।
- योगविज्ञान, विज्ञानानंद सरस्वती, योगनिकेतन ट्रस्ट, ऋषिकेश।
- आसन, प्राणायाम, मुद्रा, बन्दा, स्वामी सत्यानंद सरस्वती, योगप्रकाशन ट्रस्ट, मुंगेर, बिहार।
- ध्यान और समाधि विधियाँ, स्वामी विवेकानन्द, सेनेज पब्लिशिंग हाउस।
- एकाग्रता और ध्यान, स्वामी शिवानंद सरस्वती, योगप्रकाशन ट्रस्ट, मुंगेर, बिहार।
- हठ योगप्रदीपिका-स्वामी सत्यानंद सरस्वती, योगप्रकाशन ट्रस्ट, मुंगेर, बिहार।
- हठप्रदीपिका-स्वामी कुवलयानंद, कैवल्यधाम, लोनावला।
- घेरण्डसंहिता-स्वामी निरंजानंद सरस्वती, योगप्रकाशन ट्रस्ट, मुंगेर, बिहार।
- घेरण्डसंहिता-स्वामी दिगंबरानंद, कैवल्यधाम, लोनावला।

Signature
Deputy Director
General Education
Department of Science and Technology
MIS-18

Semester: I
Course Code: 23VAC0104T
Emotional Competence and Spirituality for Well-Being
Credits: 02
Time of Exam: 02 Hrs
Marks: 50
Internal: 15
External: 35
Course Learning Outcomes:
<ul style="list-style-type: none"> ➤ Build emotional and spiritual quotient ➤ Apply emotional intelligence in day-to-day life ➤ Apply spiritual competence for meaningful existence and adjustment in society
Unit-I
Emotion: Meaning, Components, Basic Emotions Positive and Negative Emotions, Importance of Positive Emotions Emotional Intelligence: Concept and Importance; Assessment of EQ Managing Emotions: Strategies of managing emotions Applications of emotional intelligence in personal and professional life
Unit – II
Spirituality: The concept, role and importance Spiritual Quotient: Assessment of SQ Developing spiritual capital: - Gratitude and Forgiveness: Concept and Importance Yoga, Vipasana, Meditation (Benefits and importance) Mindfulness: Concept and importance of mindful living
References:
<ul style="list-style-type: none"> ➤ Baumgardner, S. R., & Crothers, M. K. (2009). <i>Positive psychology</i>. Prentice Hall/Pearson Education. ➤ Carr, A. (2011). <i>Positive psychology: The science of happiness and human strengths</i>. Routledge. ➤ Snyder, C.R, Lopez, S.J. & Jenifer T. Pedrotti (2010). <i>Positive Psychology: The Scientific & Practical exploration of human strengths</i>. New Delhi: Sage Publications ➤ Nelson, James M., <i>Psychology Religion and Spirituality</i>. Indiana, Valparasio University, 2010. ➤ Benner, David G., (2012) <i>Spirituality and the Awakening Self</i>. Grand Rapids, Michigan: Brazos Press. ➤ Goleman, Daniel, (1996). <i>The Meditative Mind: The Varieties of Meditative Experience</i>. New York: Tarcher. ➤ Wilber, Ken,(2006) <i>Integral Spirituality</i>. Boston and London: Integral Books.

Note to Examiner: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 03 marks each. In addition to that four more questions will be set two questions from each unit. The student shall be required to attempt three questions in all selecting one question from each unit consisting of 10 marks each in addition to compulsory question number 01.



 M. J. J.

 13/5/24