FACULTY OF SCIENCES

SYLLABUS

FOR

B.Sc. (Hons.) Physics
(Semester I-IV)
Session: 2017-18

KHALSA COLLEGE AMRITSAR
(An Autonomous College)

Note: (i) Copy rights are reserved. Nobody is allowed to print it in any form. Defaulters will be prosecuted.

(ii) Subject to change in the syllabi at any time. Please visit the College website time to time.

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

Semester I

Course No.	Course Title	Assessment	Max. Marks	Total Marks
BHP-101	MECHANICS-I	15	60	75
BHP -102	ELECTRICITY AND MAGNETISM-I	15	60	75
BHP -103	MATHEMATICS –I	10	40	50
BHP -104	CHEMISTRY –I	10	40	50
BHP -105	COMMUNICATIVE ENGLISH –I	10	40	50
BHP -106	ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ) –I	10	40	50
BHP -107	ਮੁੱਢਲੀ ਪੰਜਾਬੀ–I (In Lieu of Compulsory Punjabi)	10	40	50
BHP -108	PHYSICS LAB-I	10	40	50
BHP -109	CHEMISTRY LAB-I	10	40	50

Semester II

Course No.	Course Title	Assessment	Max. Marks	Total Marks
BHP-151	ELECTRICITY & MAGNETISM-II	15	60	75
BHP -152	WAVES & OSCILLATIONS	15	60	75
BHP -153	MATHEMATICS –II	10	40	50
BHP -154	CHEMISTRY –II	10	40	50
BHP -155	COMMUNICATIVE ENGLISH –II	10	40	50
BHP -156	ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ) –II	10	40	50
BHP -157	ਮੁੱਢਲੀ ਪੰਜਾਬੀ–II (In Lieu of Compulsory Punjabi)	10	40	50
BHP -158	PHYSICS LAB-II	10	40	50
BHP -159	CHEMISTRY LAB-II	10	40	50

Semester III

Course No.	Course Title	Assessment	Max. Marks	Total Marks
BHP-201	MECHANICS-II	15	60	75
BHP -202	STATISTICAL AND THERMAL PHYSICS	15	60	75
BHP -203	MATHEMATICS-III	10	40	50

Course No.	Course Title	Assessment	Max. Marks	Total Marks
BHP -204	CHEMISTRY-III	10	40	50
BHP -205	ENVIRONMENTAL STUDIES-I	10	40	50
BHP -206	INTERDISCIPLINARY COURSE ID-I	10	40	50
BHP -207	PHYSICS LAB-III	10	40	50
BHP -208	CHEMISTRY LAB-III	10	40	50
Course No.	Course Title	Assessment	Max. Marks	Total Marks
BHP-251	OPTICS	15	60	75
BHP -252	ATOMIC SPECTROSCOPY	15	60	75
BHP -253	MATHEMATICS-IV	10	40	50
BHP -254	CHEMISTRY-IV	10	40	50
BHP -255	ENVIRONMENTAL STUDIES-II	10	40	50
BHP -256	INTERDISCIPLINARY COURSE ID-II	10	40	50
BHP -257	PHYSICS LAB-IV	10	40	50
BHP -258	CHEMISTRY LAB-IV	10	40	50

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 101 MECHANICS-I

Time: 3 Hours   **Total Marks:75**
                                    (Max. Marks: 60+Internal Assessment: 15)
Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT-I

Co-ordinate system and Motion of a Particle: Cartesian and Spherical polar co-ordinate systems; area, volume, displacement, velocity and acceleration in these systems. Solid angle, Symmetry principles and Laws of Conservation.

UNIT-II

Conservation of Momentum and Collisions: Internal forces and momentum conservation. Centre of mass. Elastic collisions in laboratory and center of mass systems; velocities, angles, energies in these systems and their relationships. Conservation of angular momentum and examples-shape of the galaxy, angular momentum of solar system. Torques due to internal forces, angular momentum about center of mass. Cross-section elastic scattering and impact parameter, Rutherford scattering.

UNIT-III

Inverse-Square-Law Force: Forces in nature (qualitative). Central forces, 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. Kepler's laws
and their derivation

UNIT-IV

Dynamics of Rigid Bodies: 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, Euler's equations. Precession and elementary gyroscope, Spinning top.
TUTORIAL : Relevant problem on the topics covered in the course.
Reference Books:

1. Mechanics-Berkeley Physics Course, Vol-I (second edition):C. Kittel, W. D. Knight, M. A. Ruderman, C. A.Helmholtz and R. J. Moyer-Tata Mc Graw Hill Publishing Company Ltd., New Delhi.

2. Fundamentals of Physics: D. Halliday, R. Resnick and J. Walker (sixth edition)-Wiley India Pvt. Ltd.

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 102 ELECTRICITY AND MAGNETISM-I

Time: 3 Hours   Total Marks:75
                                                        (Max. Marks: 60+Internal Assessment: 15)
Total Lectures: 60   Pass Marks: 35%

Instructions for the Paper Setters:

There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT-I

Calculus of Vectors : Basic Ideas of Vector Calculus**,** Introduction to gradient, divergence & curl; their physical significance. Rules for vector derivatives, useful relations involving gradient, divergence & curl. Solenoidal and irrotational fields, Fundamental theorem for gradients, Gauss's and Stoke's theorems, Helmholz and Greens theorem.

UNIT-II

Electrostatics: Electric charge and its properties, Coulombs law, Principal of Superposition The electric field due to a point charge and continuous charge distributions, Electric field due to finite and infinite lines of charges. Field due to electric dipole, field lines, flux, Gauss's law and its applications. Curl of electric field. Relation between potential and electric field. Poisson's and Laplace's equations. Electric potential due to different charge distribution Wire, Ring, Disc, Spherical Sheet, Sphere, dipole etc. The energy for a point and continuous charge distribution.

UNIT-III

Electric Currents and Fields of Moving Charges Conductors in the electrostatic field, Capacitors, Current and current density, drift velocity, expression for current density vector, Equation of continuity, electrical conductivity, limitations of Ohm's conductivity**,** Multipoles and multipole moments. Equipotential surface method of electrical images. Electric field in different frames of references, Transformation of Electric Field from one inertial Frame to another, Relation between electric force in two inertial frames, Interaction between moving charges, Electric field due to moving charges.

UNIT-IV

Electric Fields in Matter : Dielectrics, Non Polar and Polar Molecules, Polarisation of Dielectric, Polarization Vector, Atomic polarizability, Dielectric Constant, Capacity of a Capacitor, Electric Susceptibility, Free and Bound Charges, Gauss Law in Dielectric, and Displacement Vector, Energy stored in Capacitor having Dielectric Medium, Energy Density of a Dielectric Medium.

TUTORIAL : Relevant problem on the topics covered in the course.

Reference Books:

1. Introduction to Electrodynamics -D.J. Griffiths, Pearson Prentice Hall, New Delhi.

2. Electricity & Magnetism-T.S. Bhatia and Gurpreet Singh, Vishal Publications.

3. Berkeley Physics Course Vol. II (Electricity & Magnetism)- E.M.Purcell, Mc Graw hill, New York.

4. Fundamental of Physics -D. Halliday, R. Resnick and J. Walker (6th edition)-John Wiley, India Pvt. Ltd.

5. Electricity and Magnetism – A. K. Sikri, Pradeep Publications

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 103-MATHEMATICS –I

Time: 3 Hours	**Total Marks:50**
	(Max. Marks: 40+Internal Assessment: 10)
Total Lectures: 60	**Pass Marks: 35%**

Instructions for Paper Setters:

There will be four units, each unit will consists of four questions. Students have to attempt two questions from each unit. Each question carries five marks. Unit I and Unit II will be set from section A and unit III and unit IV from Section B.

Section A

The algebra of derivatives: Continuity, differentiability for one variable, standard theorems on differentiability, Chain rule, Proof of Rolle's theorem, Lagrange's mean value theorem, Cauchy's theorem and Taylor's theorem, Applications of mean value theorem, L'Hospital rule, Leibnitz theorem on higher order derivative of product of two smooth functions.

Several Variable Calculus: Functions of two and three variables, Rigorous treatment of limit, continuity, and differentiability of functions of two variables, Directional derivative, Partial derivatives, Chain rule, statements of the inverse function theorem and implicit function theorem and their applications and Euler's theorem for homogeneous functions.

Section-B

Integral Calculus: Anti-derivatives, standard techniques and formulae for anti derivatives of elementary functions. Reduction formulae, Rule of "smaller index +1", Partitions, Upper and Lower integrals, Riemann integrability, Conditions of existence of Riemann integrability of continuous functions and of monotone functions. Algebra of integrable functions. Beta and Gamma functions.

Text and Reference Books:
1. Earl Coddington, Theory of ordinary differential equations, 1984.
2. Tom M. Apostol, Calculus I & II, John-Wiley, 1967.
3. Shanti Narayan, Differential Calculus, New Delhi, Shyam Lal, 1983.
4. Shanti Narayan, Integral Calculus, Delhi, S. Chand, 1968.
5. Rajinderpal Kaur, Calculus, Ludhiana, First World Publication.

BHP 104-CHEMITRY –I

Time: 3 Hours
Total Marks:50
(Max. Marks: 40+Internal Assessment: 10)
Total Lectures: 60
Pass Marks: 35%
Instructions for the Paper Setters:

There will be five sections. Section A will consist of Eight Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT-I

Stereochemistry: Molecular chirality, enantiomers/symmetry in achiaral structures, chiral centres in chiral molecules, properties of chiral molecules-optical activity, absolute and relative configuration, the Cahn-Ingold Perlog R-S notional system physical properties of enantiomers. Stereochemistry of chemical reactions that produce chiral centres, chemical reactions that produce stereoisomers, Resolution of enantiomers, chiral centres other than carbon.

UNIT-II

Chemistry of alkanes and alkenes: Conformations of alkanes and cycloalkanes: conformational analysis of ethane, butane, cyclohexane, monosubstituted and disubstituted cyclohexane, conformation of small, medium and large ring cycloalkanes and of polycyclic ring systems.Stereochemistry of alkenes, naming stereo isometric alkenes by the E-Z system, mechanism of hydrogenation of alkenes, stereochemistry of hydrogenation of cycloalkenes, Dehydration of alcohols and regioselectivity of these reactions. Acid catalysed dehydration of alcohols with complete mechanistic discussion, Mechanism of dehydrohalogenation of alkylhalides (E mechanism), stereoselective and antielimination in E reactions, the E Mechanism, electrophilic addition of hydrogen halides to alkenes its regioselectivity explained on the basis of mechanism, free radical addition of hydrogen bromide to alkenes, acid catalysed hydration of alkene with mechanism stereochemistry of halogen addition to alkenes and its mechanistic explanation. Hypohalous acid addition to alkenes, epoxidation of alkenes.

Alkynes: Acidity of acetylene and terminal alkenes, metal ammonia reduction of alkyne, addition of hydrogen halides and water to alkynes, with detailed discussion of mechanism of these reactions, the diels Alder reaction, orbital symmetry and the diels Adler reaction.

UNIT-III

Nucleophilic substitution and addition reaction:

(a) Functional group transformation by nucleophilic substituion, the biomolecular(SN), mechanism of nucleophilic substitution, stereochemistry of SN reactions, how SN reactions occur, steric effect in SN reactions, nucleophiles and nucleophilicity, the unimolecular (SN) mechanism of nucleophilic substitution, carbocation stability and the rate of substitution, by the SN mechanism stereochemistry of SN reactions, carbocation real arrangements in SN reactions, solvent effects, substitution and elimination as competing reactions. The SN -SN.

(b) Principles of nucleophillic addition to carbonyl groups : Hydration acetal formation, cyanohydrin formation ; reactions with primary and secondary amines, Whittig reaction, steroselective addition to carbonyl groups mechanism of halogenation, acid and base catalysed cholization, haloform reaction, aldol condensation, conjugate nucleophillic addition to unsaturated carbonyl compounds

UNIT-IV

Spectroscopy: Principles of molecular spectroscopy, electromagnetic radiation, quantized energy states, NMR(H) Spectroscopy, nuclear shielding and Chemical shift measurements chemical shift and molecular structure, interpreting proton NMR spectra, spin- spin splitting in NMR spectroscopy, patterns of spin-spin splitting, proton NMR spectra of alcohols, NMR and conformations carbons- 13 nuclear magnetic resonance, the sensitivity problem, interpretation of spectra. Infrared spectroscopy, ultraviolet–visible (UV-VIS) spectroscopy and mass spectrometry.

Text and Reference Books:
1. R.T. Morison and R.N. Boyd, Organic Chemistry.
2. I.L. Finar, Organic Chemistry, Vol. I IV ed.
3. Advanced Organic Chemistry, Reactions Mechanisms and Structure by J. March.
4. Schaum's Outlines Series Theory and Probl Meislick and Jacob Sharefkin
5. Problems and their solution in Organic chemistry by I.L. Finar, Modern Organic Chemistry by J.D. Robbert and M.C. Caserio.
6. Organic Chemistry by D.J. Cram and G.S. Hammond.
7. J.E. Banks, Naming Organic Compounds –Programmed Introduction to Organic Chemistry.
8. E.L. Eliel, Stereochemistry of carbon compounds.
9. W. Camp, Organic Spectroscopy.
10. F.A. Carey, Organic Chemistry.

BHP 105-COMMUNICATIVE ENGLISH –I
B.Sc. (Hons.) Physics, Chemistry, Zoology ,Botany, Mathematics

Time: 3 Hours   **Total Marks:50**
                                         (Max. Marks: 40+Internal Assessment: 10)
                                                             Pass Marks: 35%

Course Contents:

1. Reading and Comprehension Skills:

Students will be required to read and comprehend the essays in Unit 1 and 2 of the book *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition. They will be required to answer the questions given after each essay.

2. Developing Vocabulary and using it in the Right Context:

The students will be required to master "Word List" and "Correct Usage of Commonly Used Words and Phrases" from the Chapter "Vocabulary" in the book *The Written Word.*

3. Writing Skills

Students will be required to write Paragraph Writing and Letter Writing as in the book *The Written Word* by Vandana R. Singh, Oxford University Press, New Delhi.

Suggested paper pattern:-

1. Practical Question on Paragraph Writing with internal choice as prescribed in *The Written Word*   (8 marks)

2. Short answer type questions from Unit 1 and 2 of *Making Connections : A Strategic Approach To Academic Reading*   (12 marks)

3. Essay type question with internal choice from Unit 1 and 2 of *Making Connections: A strategic Approach to Academic Reading* (8 marks)

4. A question on Letter Writing from *The Written Word* (6 marks)

5. Theoretical question(s) based on the two chapters from the book *The Written Word* (6 marks)

BHP 106 ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ) –I

Time: 3 Hours   **Total Marks:50**
(Max. Marks: 40+ Internal Assessments: 10)
Pass Marks: 35%

B.A. (Hons. –English), B.Sc. (Hons. –Physics, Chemistry), B.Sc. Agri./Bio Tech./IT/FD/ Food Sc./ Food Sc. & QC/BCA, BJMC

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. ਸਾਹਿਤ ਦੇ ਰੰਗ (ਸੰਪਾ. ਡਾ. ਮਹਿਲ ਸਿੰਘ), ਭਾਗ ਪਹਿਲਾ (ਕਵਿਤਾ ਅਤੇ ਕਹਾਣੀ), ਰਵੀ

ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

2. ਪੈਰ੍ਹਾ ਰਚਨਾ।

3. ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤੱਰ।

4. (ੳ) ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਤ : ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤੇ ਵਿਧੀਆਂ, ਸਵਰ, ਵਿਅੰਜਨ, ਸੁਰ।

(ਅ) ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ

ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।

5. ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਅਧਿਆਪਨ

(ੳ) ਪਹਿਲੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

(ਅ) ਦੂਜੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਕਵਿਤਾ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇੱਕ) 8 ਅੰਕ

2. ਕਿਸੇ ਕਹਾਣੀ ਦਾ ਸਾਰ, ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ ਜਾਂ ਪਾਤਰ ਉਸਾਰੀ (ਦੋ ਵਿਚੋਂ ਇੱਕ) 8 ਅੰਕ

3. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇੱਕ ਉੱਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ। 4 ਅੰਕ

4. ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ 4 ਅੰਕ

5. ਨੰਬਰ 5 ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ 8 ਅੰਕ ਦੇ ਆਧਾਰ 'ਤੇ ਵਰ

6. ਨੰਬਰ 6 ਵਿਚ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਪਹਿਲੀ ਭਾਸ਼ਾ ਅਤੇ ਦੂਜੀ ਭਾਸ਼ਾ ਵਜੋਂ ਅਧਿਆਪਨ, ਮਹੱਤਵ ਅਤੇ

ਸਮੱਸਿਆਵਾਂ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਦੋ ਦਾ ਉੱਤਰ

ਦੇਣਾ ਹੋਵੇਗਾ। (4+2)=8 ਅੰਕ

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 10 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 40+10 = 50 ਹਨ।

BHP 107 ਮੁੱਢਲੀ ਪੰਜਾਬੀ–I
(In Lieu of Compulsory Punjabi)

Time: 3 Hours

Total Marks:50
(Max. Marks: 40+ Internal Assessments: 10)
Pass Marks: 35%

B. A., B.A. (SS), B. A. (Hons. –English), B. Com. (Hons. & R), B. Sc. Agri./Bio-Tech./Comp. Sc./Eco./FD/Food Sc./Food Sc. & QC/IT/Med./NMed./B. Sc. Hons. – Ch./Phy./B. Int. & Mob.Tech./B. of Mult./BBA/BCA/BJMC

1. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ

ੳ) ਨਾਮਕਰਣ ਤੇ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ : ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ, ਅੱਖਰ ਕ੍ਰਮ, ਸਵਰ ਵਾਹਕ

(ੳ ਅ ੲ), ਲਗਾਂ ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ,

ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ।

ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ 15 ਅੰਕ

2. ਗੁਰਮੁਖੀ, ਆਰਥੋਗ੍ਰਾਫੀ ਅਤੇ ਉਚਾਰਨ : ਸਵਰ, ਵਿਅੰਜਨ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ ਅਤੇ ਉਚਾਰਣ, ਮੁਹਾਰਨੀ, ਲਗਾਂ ਮਾਤਰਾਂ ਦੀ ਪਛਾਣ । 10 ਅੰਕ

3. ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜ : ਮੁਕਤਾ (ਦੋ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਤਿੰਨ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ), ਸਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਬਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਔਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲੈਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਲਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲਾਵਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਹੋੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਕਨੌੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਲਗਾਂਖਰ (ਟਿੱਪੀ, ਬਿੰਦੀ, ਅੱਧਕ) ਵਾਲੇ ਸ਼ਬਦ, ਸ਼ੁੱਧ-ਅਸ਼ੁੱਧ। 15 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

6. ਪਹਿਲੇ ਭਾਗ ਵਿਚੋਂ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹੈ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। (5+5+5) 15 ਅੰਕ

7. ਭਾਗ ਦੂਸਰਾ ਵਿਚੋਂ ਦੋ-ਦੋ ਨੰਬਰ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। 10 ਅੰਕ

8. ਭਾਗ ਤੀਸਰਾ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿਨ੍ਹਾਂ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। 15 ਅੰਕ

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 108 PHYSICSLAB-I

Time: 3 Hours   **Total Marks:50**
                              (Max. Marks: 40+ Internal Assessments:10)
                                                        Pass Marks: 35%

Periods 8 Periods/week
General Guidelines for Practical
Examination
I. The distribution of marks is as follows:
i) One experiment **20 Marks**
ii) Brief Theory **5 Marks**
iii) Viva–Voce **10Marks**
iv) Record (Practical file) **5 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

1. To measure the time periods of oscillation for the objects of various geometrical shapes but of same mass.

2. To study rotational motion using a flywheel and hence show that toque is proportional to angular acceleration.

3. To find the moment of inertia of an irregular body about an axis through its centre of gravity with a torsion pendulum.

4. To determine the moment of inertia of a flywheel.

5. To determine the Young's modulus by bending.

6. Determination of Poisson's ratio for rubber.

7. To verify laws of conservation of (a) linear momentum, (b) kinetic energy in elastic collisions using one dimensional collisions of hanging spheres. (c) Also determine energy transfer and coefficient of restitution.

8. To determine modulus of rigidity of copper wire by Maxwell needle experiment.

9. To determine low resistance with Carey-Foster's Bridge with and w

10. To determine the resistance and specific resistance of a copper wire with the help of Kelvins double bridge.

11. To find the unknown capacitance of a capacitor by flashing and quenching of a neon lamp.

12. Measurement of capacitance, determination of permittivity of a medium air and relative permittivity by de–Sauty's bridge.

13. To study the flow of water through a capillary tube as a function of pressure head using two tubes of same length but different radii.

14. To study the flow of water through a capillary tube as a function of pressure head using two tubes of different length but of same radii.

15. To study the variation in resistance of filament of a bulb with temperature.

Reference Books:
1. Practical Physics Vol. I, T.S. Bhatia, Gursharan Kaur, Iqbal Singh, Vishal Publications.
2. Practical Physics, C.L. Arora, S. Chand & Co.

BHP 109 CHEMISTRY LAB- I

Time: 3 Hours   **Total Marks:50**

(Max. Marks: 40+Internal Assessment: 10)

6 Periods/week   **Pass Marks: 35%**

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

The preliminary examination of physical and chemical characteristics (physical state, colour, odor and ignition tests), elemental analysis (nitrogen, sulphur, chlorine, bromine, iodine), solubility tests including acid-base reactions, classification tests involving functional reactivity other than acid-base test, preparation of derivatives for given pure organic compounds.

The following categories of compounds should be analyzed.

-phenols, carboxylic acids

-carbonyl compounds - ketones, aldehydes

-carbohydrates

-aromatic amines -
aromatic hydrocarbons

Suggested Book:

Practical Organic Chemistry by F.G. Mann and B.C. Saunders

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 151 ELECTRICITY & MAGNETISM-II

Time: 3 Hours	**Total Marks:75**
	(Max. Marks: 60+Internal Assessment: 10)
Total Lectures: 60	**Pass Marks: 35%**

Instructions for the Paper Setters:
There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT-I

MAGNETIC EFFECTS OF ELECTRIC CURRENTS : Magnetic Effect of Electric Current, Direction of Field Lines due to current Flowing in a straight Conductor , Magnetic Field Density, Magnitude of Magnetic Flux, Magnetic and Lorentz Forces, Biot-Savart's Law, Magnetic Field Due to along Straight Conductor, Magnetic Field Intensity at point on the axis of a current loop. Variation of Field along the axis of the coil, Magnetic Field intensity inside a long Solenoid, Ampere's Circuital Law: Line Integral of Magnetic Field, Applications of Ampere's Circuital Law, Solenoid Nature of Vector Field, Properties of the Magnetic Field, Vector Potential and its expression, Surface Current Density, Changes in Magnetic Field at a current Sheet, Hall Effect, Comparison of Electrostatic Field and Magnetic Field, Transformation Equation For Electric and Magnetic Fields.

UNIT-II

MAGNETIC PROPERTIES OF MATTER : Some Important Terms associated with Magnetic Materials, Torque on current Loop, Magnetic Dipole in a Magnetic Field , Potential Energy of Magnetic Dipole, Force on Magnetic Dipole In Non-Uniform Magnetic Field, Magnetic Dipole Moment of an Atom, Expression of orbital Magnetic dipole moment of Electron, Electron Spin Magnetic Moment , Free and Bound Currents, Uniformly and. NonUniformly Magnetised Matter , Diamagnetism , Langevin's theory of diamagnetic behaviour, Paramagnetism and Langevin's Theory of Paramagnetic Susceptibility, Ferromagnetism, Domain theory of Magnetism, Analysis of magnetisation Curves : Hystersis Curve, Energy Loss Due to Hystersis and its Importance

UNIT-III

ELECTROMAGNETIC INDUCTION : Electromagnetic Induction, Faraday's Induction Experiments, Faraday's Laws of Electromagnetic Induction (Integral And Differential Forms), Lenz's law, Self Induction, Expression for Self Induction : Neumann's Formula, . Self Inductance of a Solenoid and a Torodial, Energy Stored in an Inductor, Mutual Induction, Expression for Coefficient of Mutual Induction and Reciprocity theorem, Mutual Inductance

of two Solenoids, Inductive Coupling of Electrical Circuits, Modification of Ampere's Law and the Displacement Current, Maxwell's Equation of Electromagnetism, Series and Parallel LCR Circuits, Average Power Associated With LCR Circuit

UNIT-IV

ELECTROMAGNETIC WAVES: Production of em waves, EM wave spectrum, EM wave equation for a medium having finite μ and ε but $\sigma = 0$, Nature of em waves, Wave equation for plane polarized em waves and their solutions, Relation between electric and magnetic field vectors an anem wave, Impedence of a dielectric to em waves, The Poynting vector and flow of energy in an em wave, Equation of continuity, EM waves for a medium having finite values of μ and ε but $\sigma \neq 0$, Solution of wave equation for a conducting medium, Skin depth, EM wave velocity and wave dispersion in a conductor, Behaviour of a medium as a conductor or dielectric, Characteristic impedance of a conducting medium to em waves, magnetic and electric energy densities, Poynting vector and Equation of Continuity for a Conducting medium, Reflection and transmission of em waves at the boundary (Normal and Oblique incidence).

TUTORIAL : Relevant problem on the topics covered in the course.
Text and Reference Books:

1. Electricity & Magnetism-T.S. Bhatia and Gurpreet Singh, Vishal Publishing Co.
2. Waves and Vibrations, T.S. Bhatia, Vishal Publishing Co.
3. Field & wave Electromagnetics by David & Cheng, Addison Wesley Publishing co
4.Electricity & Magnetism- A.K. Sikri, Pradeep Publications

BHP 152 WAVES & OSCILLATIONS

Time: 3 Hours   **Total Marks:75**

(Max. Marks: 60+Internal Assessment: 10)

Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT-I
Simple and Damped Oscillations: Simple Harmonic Motion, energy of SHO, Compound pendulum, Torsional pendulum, Equation of SHM, Superposition of two perpendicular SHM, Lissajous figures–superposition of many SHM's, complex number notation and use of exponential series. Damped motion of mechanical and electrical oscillator, heavy damping, critical damping. Energy dissipation and energy of damped oscillator, amplitude decay, logarithmic decrement, relaxation time, Q value, comparison between Free and Damped oscillations

UNIT-II
Forced Oscillations: Differential equation of forced mechanical oscillator**,** Transient and steady state behaviour of a forced oscillator, Variation of displacement and velocity with frequency of driving force, frequency dependence of phase angle between force and (a) displacement, (b) velocity, Power supplied to oscillator by driving force and its variation with driving force frequency, Resonance absorption and Q-value as a measure of power absorption bandwidth, Q-value as amplification factor, Forced electrical oscillator, Variation of current with frequency, Variation of power supplied with frequency of applied voltage, Q factor as amplification factor.

UNIT-III
Coupled Oscillations: Stiffness coupled oscillators, In phase and Out phase modes, normal co-ordinates and normal modes of vibration, solutions for differential equations for normal modes and exchange of energy, inductance coupling of electrical oscillators, loose, intermediate and strong coupling, energy exchange between two electrically coupled oscillators..

UNIT-IV
Wave Motion: Types of wave motion**,** The wave equation, transverse waves on a string, the string as a forced oscillator, characteristic impedance of a string, reflection and transmission of transverse waves on a string at a boundary, Energy of a progressive wave, impedance matching, standing waves on a string of fixed length, Energy of a vibrating string, normal modes and eigen frequencies. Energy in a normal mode of oscillation,wave groups, group velocity, dispersive and non dispersive media, Longitudnal waves.

TUTORIAL : Relevant problem on the topics covered in the course.

Reference Books:
1. Waves and Vibrations, T.S. Bhatia, Vishal Publishing Co.
2. The Physics of Vibrations and Waves- H.J. Pain, John Wiley, Chichester, 1999
3. Vibrations and Waves in Physics- I.G. Main-Cambridge University, Cambridge, 1993.

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-153 MATHEMATICS –II

Time: 3 Hours   **Total Marks:50**
                                                                    (Max. Marks: 40+Internal Assessment: 10)
Total Lectures: 60   **Pass Marks: 35%**

Instructions for Paper Setters:
There will be four units. Each unit will consists of four questions. Students have to attempt two questions from each unit .Each question carries five marks. Unit I and Unit II will be set from section A and unit III and unit IV from Section B.

Section A

Ordinary Differential Equations(ODEs): Definition & formation of linear ODEs, First order Linear, Linear homogenous and non-homogeneous ODEs of second order, Complementary function and particular integral, Solutions of Linear differential equations with constant and variable coefficients, Solution by variation of parameters method.

Partial Differential Equations (PDEs): First order PDEs: Definition, origins of first order PDEs. Second order PDEs, Definition, origins of second order PDEs, Second order PDEs in Physics, Laplace, Wave, and diffusion equation in one and two dimensions, Solutions of second order PDEs by separation of variables.

Section B

Double Integral, Change of order of integration, Area and volume by double integral, Triple integral, change of variables, Volume by triple integral, Volume as surface of revolution, centre of gravity and moment of inertia by double and triple integral.

Reference Books:

1. I. N. Sneddon, Elements of Partial Differential Equations, Dover, 2006.
(Scope in Chapters 2-6)
3. Applied Mathematics for Engineers and Physicists : Pipes & Harvill, London, McGraw Hill, 1970.
4. Mathematics of Physics and Modern Engineering : Sokolnikoff & Recheffer
5. Mathematical Methods for Physicists : George Arfken, New York, Academic Press, 1970.

BHP 154-CHEMITRY –II

Time: 3 Hours   Total Marks:50

(Max. Marks: 40+Internal Assessment: 10)

Total Lectures: 60   Pass Marks: 35%

Instructions for the Paper Setters:

There will be five sections. Section A will consist of Eight Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT-I

Co-ordination Chemistry: Introduction, Werner's coordina-ordinate complexes. Co-ordination numbers 1-12 and their stereo-chemistries.Factors affecting co-ordination numbers and stereo-chemistry

(a)   Configurational Isomers

(b)   Conformational isomerism, VSPER theory, molecular orbital theory applied to homoneuclear diatomic molecules and heteronuclear Diatomic molecules.

Bonding in metal complexes: Valence bond theory for co-ordinate complexes, inner And outer orbital complexes, Electro-neutrality and back bonding, limitations of V.B. theory.

Stability of coordination compounds: Introduction, Stability constant, stepwise stability constant, overall stability constant. Factors affecting the stability of metal ion complexes with general ligands, HSAB principle.

UNIT-II

Crystal field theory: Splitting of d-orbitals in octahedral, tetrahedral, cubic and square planer fields of ligands. Calculation of C.F.S.E. in high spin and low spin octahedral and High spin tetrahedral complexes, factors affecting the 10 Dq Value. Structural effects of crystal field splitting (Jahn-Teller distortion, variation of Ionic radii with increase in atomic number). Thermodynamics effects of C.F. splitting, variation in lattice energies, Hydration energies, Dissociation energies, Formation constants of hexammines. Site selection in spinels, Paramagnetism, diamagnetism, ferro and anti ferromagnetism. Microstates and spectroscopic terms, a calculation of spectroscopic terms for d^1 electronic configurations, L S coupling, Hund's rule for findingElectronic spectralthepropertiesgroundofIsttransitionstate te series, Orgel Diagrams for d^1 - d^{10} systems, for weak field octahedral and tetrahedral complexes, limitations of C.F.T

UNIT-III

Molecular Orbital Theory: Evidence for covalent character in Bonding, MOEL diagram for octahedral and tetrahedral complexes involving bonding, charge transfer transitions. **πAcid Ligands:**DefinitionCarbon monoxide complexes, bonding in linear MCO groups, polynuclear metal carbonyls, vibrational spectra, Reactions, carbonyl hydrides and halides. Metal-metal bonding metal-metal multiple bonding , isolable analogies, Structure of high nuclearity carbonyl clusters, counting of electrons in carbonyl clusters.

UNIT-IV

Alkali metal and alkaline earth metal chelators: Macrocyclic ligands, macrocyclic effect, crown ethers and podands, coronands, cryptands, structure of 18 crown-6 complex with KNCS, ion cavity complex, effect of anion and cation type on complex structure, simultaneous complexation of metal ion and water or of two metal ions, sandwich formation, cryptands and their cation complexes, podands with aromatic donors and groups.

Text and Reference Books:

1.   J.E. Huheey, Inorganic Chemistry, 3rd Ed.
2.   F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry.
3.   B.E. Douglas and D.H. McDaniel, Concepts and Models of Inorganic Chemistry.
4.   R. Hilgenfeld and W. Saengar, Topics in current chemistry Vol-II.

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 155-COMMUNICATIVE ENGLISH –II
B.Sc. (Hons.) Physics, Chemistry, Zoology ,Botany, Mathematics

Time: 3 Hours   Total Marks:50
                              (Max. Marks: 40+Internal Assessment: 10)
                                                      Pass Marks: 35%

Course Contents:

1. Reading and Comprehension Skills:

Students will be required to read and comprehend the essays in Unit 3 and 4 of the book *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition. They will be required to answer the questions given after each essay.

2. Writing Skills

Students will be required to learn Essay writing, Report Writing and Letter Writing as in the book *The Written Word* by Vandana R. Singh, Oxford University Press, New Delhi.

Suggested paper pattern:-

1.   Practical Question on Essay Writing with internal choice as prescribed in *The Written Word*   (8 marks)

2.   Short answer type questions from Unit 3 and 4 of *Making Connections : A Strategic Approach To Academic Reading*   (12 marks)

3.   Essay type question with internal choice from Unit 3 and 4 of *Making Connections: A strategic Approach to Academic Reading* (8 marks)

4.   Question on note making from *The Written Word* (6 marks)

5.   Theoretical question(s) based on the two chapters from the book *The Written Word* (6 marks)

BHP 156 PUNJABI –II

Time: 3 Hours
Total Marks: 50
(Max. Marks: 40 + Internal Assessments: 10)
Pass Marks: 35%

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. ਸਾਹਿਤ ਦੇ ਰੰਗ (ਸੰਪਾ. ਡਾ. ਮਹਿਲ ਸਿੰਘ), ਭਾਗ ਦੂਜਾ (ਵਾਰਤਕ ਅਤੇ ਰੇਖਾ-ਚਿੱਤਰ), ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

1. ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ : ਪਰਿਭਾਸ਼ਾ, ਮੁਢਲੇ ਸੰਕਲਪ।

2. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ

3. ਪੈਰ੍ਹਾ ਰਚਨਾ

4. ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ

5. ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਲੇਖ/ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇੱਕ) (8 ਅੰਕ)

2. ਰੇਖਾ ਚਿਤਰ : ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਸ਼ਖਸੀਅਤ ਦੇ ਗੁਣ (8 ਅੰਕ)

3. ਯੂਨਿਟ 3-4 ਨੰਬਰ ਉਪਤੇ ਦਿਪਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ (8 ਅੰਕ)

5. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇੱਕ ਉੱਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ । (4 ਅੰਕ)

6. ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਪਤਰ (4 ਅੰਕ)

7. ਨੰਬਰ 7 ਵਿਚ ਅਖਠ ਅਖਾਣ ਅਤੇ ਅੱਠ ਮੁਹਾਵਰੇ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਚਾਰ-ਚਾਰ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤ ਕੇ ਅਰਥ ਸਪੱਸ਼ਟ ਕਰਨੇ ਹੋਣਗੇ। (4+4 = 8 ਅੰਕ)

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 10 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 40+10 = 50 ਹਨ।

BHP 157 ਮੁੱਢਲੀ ਪੰਜਾਬੀ –II

(In Lieu of Compulsory Punjab)

Time: 3 Hours

Total Marks: 50
(Max. Marks: 40 + Internal Assessment: 10)
Pass Marks: 35%

B. A., B.A. (SS), B. A. (Hons. –English), B. Com. (Hons. & R), B. Sc. Agri./Bio-Tech./Comp. Sc./Eco./FD/Food Sc./Food Sc. & QC/IT/Med./NMed./ B. Sc. Hons. – Ch./Phy./B. Int. & Mob.Tech./B. of Mult./BBA/BCA/BJMC

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਧਾਤੂ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਮਧੇਤਰ, ਪਿਛੇਤਰ), ਪੰਜਾਬੀ ਕੋਸ਼ਗਤ ਸ਼ਬਦ ਅਤੇ ਵਿਆਕਰਨਿਕ ਸ਼ਬਦ 15 ਅੰਕ

2. ਪੰਜਾਬੀ ਸ਼ਬਦ ਪ੍ਰਕਾਰ :

ੳ) ਸੰਯੁਕਤ ਸ਼ਬਦ, ਸਮਾਸੀ ਸ਼ਬਦ, ਦੋਜਾਤੀ ਸ਼ਬਦ, ਦੋਹਰੇ/ਦੁਹਰੁਕਤੀ ਸ਼ਬਦ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ 10 ਅੰਕ

3. ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ :

ੳ) ਇਕ-ਵਚਨ ਬਹੁ-ਵਚਨ, ਲਿੰਗ -ਪੁਲਿੰਗ, ਬਹੁ-ਅਰਥਕ ਸ਼ਬਦ, ਸਮਾਨ-ਅਰਥਕ ਸ਼ਬਦ, ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਲਈ ਇੱਕ ਸ਼ਬਦ, ਸ਼ਬਦ ਜੋੜ, ਵਿਰੋਧਆਰਥਕ ਸ਼ਬਦ

ਅ) ਨਿਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਖਾਣ-ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ, ਮਾਰਕੀਟ/ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਿਤ। 10+5=15 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਭਾਗ ਪਹਿਲਾਂ ਵਿੱਚੋਂ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿੱਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹਨ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਪੰਜ-ਪੰਜ ਨੰਬਰ ਹਨ । 15 ਅੰਕ

2. ਭਾਗ ਦੂਸਰਾ ਵਿੱਚੋਂ ਦੋ-ਦੋ ਨੰਬਰ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। 10 ਅੰਕ

3. ਭਾਗ ਤੀਸਰਾ ਦੇ (ੳ) ਭਾਗ ਵਿੱਚੋਂ ਦੋ ਸਵਾਲ ਅਤੇ (ਅ) ਭਾਗ ਵਿੱਚੋਂ ਇੱਕ ਸਵਾਲ ਪੁੱਛਿਆ ਜਾਵੇਗਾ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। 10+5=15 ਅੰਕ

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 10 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 40+10 = 50 ਹਨ।

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP 158 PHYSICS LAB-II

Time: 3 Hours   **Total Marks: 50**
                                    (Max. Marks: 40 + Internal Assessment: 10)
                                                          Pass Marks: 35%

8 Periods/ Week

General Guidelines for Practical Examination
I. The distribution of marks is as follows:
i) One experiment **20 Marks**
ii) Brief Theory **5 Marks**
iii) Viva–Voce **10Marks**
iv) Record (Practical file) **5 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

1. To study the magnetic field produced by a current carrying solenoid using a search coil and calculate permeability of air.

2. To study the induced e.m.f. as a function of the velocity of the magnet.

3. To study the phase relationships using impedance triangle for LCR circuit and calculate impedance.

4. Resonance in a series and parallel LCR circuits for different R–value and calculate Q–value.

5. To measure the charge sensitivity of a moving coil Ballistic galvanometer using a known capacitor.

7. To measure the self-inductance L of a given coil by Anderson Bridge method.

8. To find the value of B_H, the horizontal component of ear using a deflection & vibration magnetometer.

9. To study the variation of magnetic field with distance along the axis of coil carrying current by plotting a graph.

10. To plot a graph between the distance of the knife edge from the centre of gravity and the time period of a compound pendulum from graph find (a) acceleration due to gravity, (b) the radius of gyration and moment of intertia about an axis passing through centre of gravity.

11.   To determine the acceleration due to gra

12. To verify the laws of vibrating string by using Meldes apparatus and to show that /2 $\lambda$is constant.

13.To measure logarithmic decrement, coefficient of damping, relaxation time and quality factor of a damped simple pendulum.

Reference Books:
1. Practical Physics Vol. I, T.S. Bhatia, Gursharan Kaur, Iqbal Singh, Vishal Publications.
2. Practical Physics, C.L. Arora, S. Chand & Co.

BHP 159 CHEMISTRY LAB-II

Time: 3 Hours   **Total Marks:50**
(Max. Marks: 40+Internal Assessment: 10)
Pass Marks: 35%

6 Periods/week
General Guidelines for Practical Examination
I. The distribution of marks is as follows:
Identification of cations and anions in a mixture which may contain combinations of acid ions. These must contain interferring acid anions and one, the insoluble.

a) Special Tests for Mixture of Anions

(i) Carbonate in the presence of sulphate.
(ii) Nitrate in the presence of nitrite
(iii) Nitrate in the presence of bromide and iodide.
(iv) Nitrate in the presence of chlorate.
(v) Chloride in the presence of bromide and iodide.
(vi) Chloride in the presence of iodide.
(vii) Bromide and iodide in the presence of each other and of chloride.
(viii) Phosphate, arsenate and arsenite in the presence of each other.
(ix) Sulphide, sulphite, thiosulphate and sulphate in the presence of each other.
(x) Borate in the presence of copper and barium salts.
(xi) Oxalate in the presence of fluoride.

b) Separation and Identification of Cations in Mixtures

(i) Separation of cations in groups.
(ii) Separation and identification of Group I, Group II (Group IIA and IIB), Group III, Group IV, Group V and Group VI cations.

Book: Vogel's book on Inorganic Qualitative Analysis

BHP-201 MECHANICS-II

Time: 3 Hours   **Total Marks: 75**
                                                    (Max. Marks: 60 + Internal Assessment: 15)
Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks

UNIT–I

Frames of References: Inertial frame of reference, Galilean transformation, Galilean Invariance of space & time intervals; Michelson Morley Experiment, Explanation of the Null Result, Postulates of Special Theory of Relativity, Fictitious forces, Effect of rotation of earth on 'g', Effects of centrifugal and Coriolis forces produced as a result of earth's rotation. Foucault's pendulum and its equation of motion.

UNIT–II

The Lorentz Transformation: Lorentz transformation equations, Length contraction, Time dilation, Experimental evidence in support of time dilation, Twin paradox, Relativity of simultaneity, Relativistic formula for the composition of velocities, The velocity addition theorem

UNIT–III

Relativistic Dynamics: Variation of mass with velocity: Relativity of mass, mass energy equivalence, Relation between momentum and energy, Transformation equations for momentum and energy, Relativistic Doppler effect (longitudinal and transverse) and its confirmation.

UNIT–IV

Structure of Spacetime and Principle of Equivalence: Concept of Minkowski space, geometrical interpretation of Lorentz transformations of space & time; simultaneity; contraction and dilation. Space-like, time like and light-like intervals, four vectors, concept of world lines, Principle of Equivalence, gravitational and inertial mass, gravitational mass of photons, gravitational red shift, Precession of the perihelion of Mercury.

TUTORIAL : Relevant problem on the topics covered in the course.
Reference Books:
1. Relativity and Electromagnetism, T.S. Bhatia, Vishal Publishing Co.
2.. Mechanics : Berkeley Physics Course Vol-I, C. Kittel, W.D. Knight, M.A. Ruderman, C.A. Helmholtz and B.J. Moyer- Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. The Special Theory of Relativity, S. Banerji & A. Banerji (Prentice Hall India).
4. Introduction of to Special Relativity: R. Resnick Wiley Eastern India Pvt. Ltd.

5.TheFeymann Lectures Physics: R.P. Feymann, R.B. Leighton and M. Sands, Vol. I & II-Narosa Publishing House, New Delhi.
6."Special Relativity" A.P. French, N.W. Norton and Company Inc. , New York

BHP-202 STATISTICAL AND THERMALPHYSICS

Time: 3 Hours   **Total Marks: 75**

                                   (Max. Marks: 60 + Internal Assessment: 15)

Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks

UNIT–I

Basic ideas of Statistical Physics, Scope of Statistical Physics, Basic ideas about probability, Distribution of four distinguishable particles into compartments of equal size. Concept of macrostates, microstates, Thermodynamic Priobability, Effects of constraints on the system. Distribution of n particles in two compartments. Deviation from the state of maximum probability. Equilibrium state of dynamic system. Distribution of distinguishable n particles in k compartments of unequal sizes.

UNIT–II

Phase space and division into elementary cells. Three kinds of statistics. The basic approach in three statistics. Maxwell Boltzman (MB) statistics applied to an ideal gas in equilibrium. Experimental verification of law of distribution of molecular speeds. Need for Quantum Statistics – B.E. Statement of planck's law of Radiation Wien's Displacement and Stefan's law. Pressure exerted by radiations, equation of state of Photon gas, Radiation pressure and stability of massive stars, Fermi Dirac (FD) statistics. Application of FD statistics to free electron gas inside conductor, equation of state of a degenerate Fermi gas, Stability of white dwarfs, Comparison of M.B, B.E and F.D statistics, relative occupation of energy levels.

UNIT- III

Statistical Basis of Entropy : Definition of entropy, change of entropy of a system, third law of thermodynamics. Additive nature of entropy, law of increase of entropy, reversible and irreversible processes and their examples, work done in a reversible process, Examples of increase of entropy in some natural processes, entropy and disorder. Brief review of terms used in thermodynamics, Laws of Thermodynamics, Carnot's Heat Engine, Entropy changes in Carnot's cycle, Carnot's theorem, Thermodynamic temperature scale, Thermoelectric effect

and its Aplications, change of entropy along a reversible path in P-V diagram, entropy of a perfect gas, equation of state of an ideal gas, Heat death of Universe.

UNIT- IV

Maxwell's Thermodynamic Relations : Perfect differentials in Thermodynamics, Derivation Maxwell Thermodynamic Relationships, Cooling produced by adiabatic expansion, adiabatic compression, adiabatic stretching of wires and thin films, change of internal energy with volume. Expression for Cp-Cv, variation of Cv with volume, Clapeyron's equation. Joule-Thomson effect and its thermodynamic treatment,Joule-Thomson effect for a Vander Waal's gas, Production of very low temperatures by adiabatic demagnetization, Concept of Negative Temperatures, Thermodynamic Potentials and Equilibrium of Thermodynamic Systems, First and Second-order phase transitions. Phase Diagram of Helium, Gibb's Phase Rule and Its Applications. Equation of state of an ideal gas, degrees of freedom, Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic, Mean free path (Zeroth Order.

TUTORIAL : Relevant problem on the topics covered in the course.
Reference Books:

1. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.

2. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press.

3. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.

4. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill

5. Statistical Physics and Thermodynamics, V.S. Bhatia and T.S. Bhatia(Vishal Publishing Co.)

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-203 MATHEMATICS-III

Time: 3 Hours   **Total Marks: 50**
                                          (Max. Marks: 40 + Internal Assessment: 10)
Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be four units, Each unit will consists of four questions. Students have to attempt two questions from each unit .Each question carries five marks. Unit I and Unit II will be set from section A and unit III and unit IV from Section B.

Section A

Complex numbers: Complex numbers and their geometrical representation, De-Moivre's theorem and its applications.

Co-ordinate Geometry: Polar and Cartesian co-ordinates. Distance formula. Section formula of a line in different forms. Angle between two lines. Intersection of two lines. Standard equation of ellipse, parabola and hyperbola.

Section –B

Infinite series, Series of positive terms, Alternate series, Behaviour of infinite series, Cauchy's convergence criterion., D'Alembert's ratio test, Cauchy's Root test, Raabe's test, Gauss test,Cauchy's integral test, Leibnitz's theorem, Absolute and conditional convergence (Tests Without proof).

Books Recommended:
1. Malik, S.C: Mathematical Analysis, Wiley Eastern Ltd.(1991).
2. Apostal, T.M.: Mathematical Analysis, Addison Wesley Series in Mathematics(1974).
3. RajinderPal Kaur, Geometry: Co-ordinate and Solid, Sharma Publication Jalandhar (2016)

BHP-204 CHEMISTRY-III

Time: 3 Hours   **Total Marks: 50**
                                    (Max. Marks: 40 + Internal Assessment: 10)
Total Lectures: 60   **Pass Marks: 35%**
Instructions for the Paper Setters:
There will be five sections. Section A will consist of Eight Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT I
1. Solutions and Colligative Properties   **12Hrs.**
Ideal and non–ideal solutions, methods of expressing concentrations of solutions, Dilute solution, colligative properties, Raoult's law, relative lowering ofvapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and itsmeasurement, determination of molecular weight from osmotic pressure, elevation of boilingpoint and depression of freezing point.

UNIT-II
2. Surface Chemistry   **11 Hrs.**
Bulk phases and interfacial region,types of interfaces; Surface tension and interfacial tension.Thermodynamics of surfaces, plane interface, curved interface, Laplace and Kelvin equations, the contactangle, capillary rise and surface tension. Surface tension of solutions,Gibbs adsorption equation and itsderivation from thermodynamic considerations. Surfactants, Surface films on liquids. Criteria for
spreading in liquid-liquid systems. (Wetting as contact angle and capitulary action Phenomenon solidliquidsystems).

UNIT-III

3. Chemical Kinetics   **7 Hrs.**
Rate of reaction, rate constant and rate laws, the order of reaction, first, second & third and zero orderreactions, half-lives; determination of reaction order. Temperature dependence of reaction rates, reactionmechanism, rate-determining step approximation, steady-state approximation. Catalysis, homogeneous catalysis, autocatalysis, oscillation reactions.Enzyme catalysis, heterogeneous catalysis.

UNIT-IV
4. Liquid State   **10 Hrs.**
Intermolecular forces, structure of liquids (a qualitative description). Structural differencesbetween solids, liquids and gases. Liquid crystals: Difference between liquids crystal, solid andliquid.Classification, structure of nematic and cholestric phases.Thermography and sevensegment cell.

5. Colloidal State   **5 Hrs.**
Definition of colloids, classification of colloids. Solids in liquids (Sol): kinetic, optical andelectrical, properties, stability of colloids,protective action, Hardy Schulze law, gold number.Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifiers.generalapplications of colloids.

Suggested Books

ESSENTIAL:
1. Physical Chemistry by P.W. Atkins, 8th Ed., Oxford University Press, 2006 (Indian Print).
2. Physical Chemistry by T. Engel & P. Reid, 1st ed., Pearson Education, 2006.
3. Physical Chemistry by Castellan, 3rd Ed., Addison Wisley/Narosa, 1985 (Indian Print)

FURTHER READING:
1. Physical Chemistry by G. M. Barrow, 6th Ed., New York, McGraw Hill, 1996.
2. Physical Chemistry by R. J. Silbey, R. A. Albert &Moungi G. Bawendi, 4th Ed., New York: John Wiley, 2005.

BHP-205 ENVIRONMENTAL STUDIES-I(COMPULSORY)

Time: 3 Hours   **Total Marks: 50**

(Max. Marks: 40 + Internal Assessment: 10)

Total Lectures: 60   **Pass Marks: 35%**

Theory Lectures: 1½ Hours/ Week

Section–A: (12 Marks): It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying four marks. Answer to any of the questions should not exceed two pages.

Section–B: (16 Marks): It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying eight marks. Answer to any of the questions should not exceed four pages.

Section–C: (12 Marks): It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

1. The Multidisciplinary Nature of Environmental Studies:

- Definition, scope & its importance.

- Need for public awareness.

2. Natural Resources:

- Natural resources and associated problems:

    a) Forest Resources: Use of over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

    b) Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

    c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

    d) Food Resources: World food problems, change caused by agriculture and overgrazing,

    effects or modern agriculture, fertilizer-pesticide problem, salinity, case studies.

    e) Energy Resources: Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.

f) Land Recourses: Land as a resource, land degradation, soil erosion and desertification.

- Role of an individual in conservation of natural resources.

- Equitable use of resources for sustainable lifestyles.

3. Ecosystem:

- 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

ecosystems:

  a. Forest ecosystem

  b. Grassland ecosystem

  c. Desert ecosystem

  d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

4. Social Issues and Environment:

- From unsustainable to sustainable development.

- Urban problems related to energy.

- Water conservation, rain water harvesting, watershed management.

- Resettlement and rehabilitation of people; its problems and concerns.Case studies.

- Environmental ethics: Issues and possible solutions.

- Climate change, global warning, acid rain, ozone layer depletion, nuclear accidents and

holocause. Case studies.

- Wasteland reclamation.

- Consumerism and waste products.

- Environmental Protection Act:

  ➢ Air (prevention and Control of Pollution) Act.
  ➢ Water (prevention and Control of Pollution) Act.
  ➢ Wildlife Protection Act.
  ➢ Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.

- Public awareness.

5. National Service Scheme

- **Introduction and Basic Concepts of NSS:** History, philosophy, aims & objectives of NSS; Emblem, flag, motto, song, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries.
- **Health, Hygiene & Sanitation:** Definition, needs and scope of health education; Food and Nutrition; Safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan); National Health Programme; Reproductive health.

References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.

2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.

3. Down to Earth, Centre for Science and Environment, New Delhi.

4. Jadhav, H. &Bhosale, V. M. 1995. Environmental Protection and Laws.Himalaya Pub.

5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson

Education (Singapore) Pte. Ltd., Delhi.

6. Kaushik, A. &Kaushik, C. P. 2004. Perspective in Environmental Studies,

New Age International (P) Ltd, New Delhi.

7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.

8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.

9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex,

Amritsar

10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

BHP-206 INTERDICIPINARY COURSE ID-I

Psychology

Time: 3 Hours   **Total Marks: 50**
                                   (Max. Marks: 40 + Internal Assessment: 10)
Total Lectures: 60   **Pass Marks: 35%**

Section A: - Ten Questions will be set in Section A .Students are required to Attempt all the questions in about 50 words. Each question carries 2 marks.   **10x2=20 Marks**
Section B: - Eight questions will be set. Students are required to attempt any five out of the eight questions in about 100 words. Each question carries 4 marks.   **5x4=20 Marks**

UNIT-I

Personality
    a. Knowledge of theories of personality(Eysenck, Freud, Erickson and Big Five)
    b. Personality tests

Attitudes
    a. Knowledge of the nature of attitudes
    b. Identify the components of attitudes (cognitive, affective and behavioral)

Motivation
    a. Theories of motivation (Maslow and Herzberg)
    b. Differentiate between primary and secondary motivation.

UNIT-II

Goal Setting
    a. Understanding Goal Setting (Locke's theory)
    b. Goal-Setting Principles

Mental Imagery
    a. Understanding the use Working, Impact, Contribution, Structuring of Mental Imagery in Sport
    b. Maximizing the value of Mental Imagery

UNIT- III

Confidence
    a. Defining confidence (Vealey)
    b. Defining and Developing optimistic mind-set
    c. Knowledge of self-efficacy (Bandura)

Concentration
    a. Understanding concentration
    b. Components, Strategies of concentration

References:-

1. Human motivation by David C. McClelland, Cambridge University Press
2. Psychology of Motivation by Denis Waitley, Nova Publishers.
3. Theories of Personality by Jess Feist, Gregory J Feist, Irwin/McGraw-Hill.
4. Attitudes and attitude change by William D. Crano, RadmilaPrislin, Psychology Press.
5. Attitudes amd attitude change by William D. Crano, RadmilaPrish, Psychology Prsess.
6. Morgan and King: Introduction to Psychology - Tata McGraw Hill.
7. Social Psychology in Sport by Sophia Jowett, David Lavallee, Human Kinetics.

BHP-207 PHYSICS LAB-III

General Guidelines for Practical Examination

Time: 3 Hours

Total Marks: 50
(Max. Marks: 40 + Internal Assessments: 10)
Pass Marks: 35%

Periods 8 Periods/week
I. The distribution of marks is as follows:

i) One experiment **20 Marks**

ii) Brief Theory **5 Marks**

iii) Viva–Voce **10Marks**

iv) Record (Practical file) **5 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

1. To measure an accessible (Horizontal and vertical) height using sextant.
2. To measure inaccessible height by using sextant.
3. Verify laws of probability distribution by throwing of similar coins.
4. To study adiabatic expansion of gas and hence to calculate value of γ.
5. To determine the heating efficiency of an electric kettle with varying voltage.
6. To determine Stefan's constant using Boltzmann's Law.
7. To find the coefficient of Thermal Conductivity of a bad conductor by Lee's method.
8. To plot a calibration curve of a given thermocouple (copper constantan) using a potentiometer.
9. To measure thermal expansion of crystal using interference fringes.
10. To measure the thermo e.m.f. as a function of temperature of the hot junction.
11. To study the random sampling of AC source.

Reference Books :

1. Practical Physics Vol.II, T.S. Bhatia, Gursharan Kaur, Iqbal Singh, Vishal Publications

2. Practical Physics, C.L. Arora, S. Chand & Co.

BHP-208 CHEMISTRY LAB-III

Physical Chemistry

Time: 3 Hours   **Total Marks: 50**
                        (Max. Marks: 40 + Internal Assessment: 10)
6 Periods/week   **Pass Marks: 35%**

Crystallisation:
Concept of indication of crystallisation. Phthalic acid from hot water (using fluted filter paper &
stem less funnel)
Acetanilide from boiling water.
Naphthalene from Ethanol
Benzoic acid from water

Physical Chemistry
1. To determine the specific reaction rate of hydrolysis of ethyl acetate catalyzed by Hydrogen ions at room temperature.
2. To study the effect of acid strength on hydrolysis of an ester.

Viscosity, Surface Tension (Pure Liquids)
3. To study the viscosity and surface tension of glycerine solution in water.
4. To determine the solubility of benzoic acid at different temperatures and to determine H of the dissolution process.
5. To determine the enthalpy of neutralization of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionization of the weak acid/weak base.
6. To determine the enthalpy of dissolution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-251 OPTICS

Time: 3 Hours **Total Marks: 75**

(Max. Marks: 60 + Internal Assessment: 15)

Total Lectures: 60 **Pass Marks: 35%**

Instructions for the Paper Setters:

There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT–I

Interference of Light: Superposition of light waves and interference, young's double slit experiment, Distribution of intensity in young's double slit experiment, Conditions for sustained interference pattern, Coherent sources of light, Temporal and spatial coherence, Mathematical analysis of temporal coherence, Interference pattern by division of wave front, Theory of interference fringes Fresnel Biprism, thickness of thin transparent sheet Fresnel double mirror, Llyod's single mirror, Displacement of fringes,.

UNIT–II

Interference by Division of Amplitude:Change of phase on reflection, Interference in thin films due to reflected and transmitted light, colour of thin film, Need for extended source for interference by division of amplitude, Fringes of equal inclination and equal. Thickness non reflecting films, Newton's Rings and their application Michelson Interferometer and their application, Fabry Perot interferometer and etalon. Distribution of intensity in Fabry Perot fringes. Anti reflection coatings

UNIT–III

Diffraction: Diffraction of Light, Huygen,s Principle, Huygen's -fresnel Diffraction theory, half-period zones, Zone plate, Diffraction at a straight edge,Diffraction by a circular aperture, diffraction by circular disc Distinction between fresnel and fraunhoffer diffraction. Fraunhoffer diffraction at a single slit, at double slit, at rectangular and circular apertures, Effect of diffraction in optical imaging, Diffraction of N slits, dispersive power, Rayleigh Criterion for resolving power, Resolving power of telescope in diffraction grating, its use as a spectroscopic element and its resolving power, Resolving power of microscope. Resolving power of fabry-perot interferometer.

UNIT–IV

Polarization: Transverse nature of light, Polarization by reflection and refraction, Brewster's Law, Malus Law, Double refraction, Nicol Prism, Elliptically and circularly polarized light, Quarter wave and half-wave plates, production and detection of polarized light, Optical activity, specific rotation. Half shade polarimeter

TUTORIAL : Relevant problem on the topics covered in the course.
Reference Books:

1. Text book of Optics: N. Subramanayam, B. Lal and M. N. Avadhamulu

2. Fundamentals of Optics: Jenkins and White

3. Optics: Ajoy Ghatak

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-252 ATOMIC SPECTROSCOPY

Time: 3 Hours   **Total Marks: 75**
                                    (Max. Marks: 60 + Internal Assessment: 15)
Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be five sections. Section A will consist of Six Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks

Unit-I

Introduction to Atomic Spectra: Observation of spectra, Types of spectra, Light sources, Spectral analysis, Units in spectroscopy, Bohr's Theory and Hydrogen spectrum, Explanation of Spectral series, Representation of spectral lines by terms, Energy level Diagram, Ritz combination Rule, Continuum at series limit, Evidences in favour of Bohr's Theory, Experimental confirmation of Bohr's theory, Franck-Hertz Experiment.

Unit-II

Spectra of Alkali Atoms: Different series in Alkali Spectra, Term values. The effective quantum number and the quantum defect, The Spinning electron and the vector model, The normal order of fine structure doublets, Electron Spin orbit interaction, Spin orbit interaction for Non-penetrating orbits, Doublet structure in alkali Spectra (Fine Structure), Energy level diagram of Sodium Atom, Selection rules for doublets, Intensity rules for fine structure doublets.

Unit-III

Zeeman Effect and the Paschen-Bach effect: Early discoveries and developments, The vector model of one electron system in weak magnetic field. The magnetic moment of a bound electron, Magnetic interaction energy, Selection rules, Intensity rules, The Paschen-Bach effect, The Paschen-Bach effect of a Principal-series doublet, Selection rules for the Paschen-Bach effect, the Zeeman and Paschen-Bach effect of hydrogen.

Unit-IV

X-rays Spectra: Production of X-rays, Origin of X-rays from electromagnetic theory, X-ray diffraction, Bragg's law, Laue Spots, Bragg's spectrometer, Reflection and refraction of X-rays, Xray scattering, Continuous X-ray spectrum, Characteristics absorption and emission Spectra, comparison of optical and X-ray Spectra, Moseley's law, Applications of Moseley's law.

TUTORIAL : Relevant problem on the topics covered in the course.
Text and Reference Books:

1. Introduction to Atomic Spectra by H. E. White

2. Atomic Spectra and Atomic structure by Gerhard Herzberg

3. Concepts of Modern Physics by Arthur Beiser

4. Elements of Spectroscopy by Gupta, Kumar and Sharma

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-253 MATHEMATICS-IV

Time: 3 Hours   **Total Marks: 50**
                                          (Max. Marks: 40 + Internal Assessment: 10)
Total Lectures: 60   **Pass Marks: 35%**

Instructions for the Paper Setters:
There will be four units, each unit will consists of four questions. Students have to attempt two questions from each unit .Each question carries five marks. Unit I and Unit II will be set from section A and unit III and unit IV from Section B.

Section A

Determinants & Matrices: Properties of matrices and determinants, Algebra of matrices, Eigen values and eigenvectors, bilinear forms, canonical forms, Unitary, Hermitian, and Orthogonal matrices and their properties, Cayley-Hamilton theorem, Rank of a matrix, Condition of Consistency of linear systems, Introduction to vectors spaces, linear maps, basis and dimension.

Section B

Probability theory and distributions: Axiomatic theory of probability, probability density function, conditional probability, mathematical expectation, moments, moment generating function, characteristic function, central limit theorem, conditional and marginal distribution, special frequency distributions, Binomial, Poisson, Normal, Uniform, Gamma, Beta, and Exponential distribution.

References Books:-
1. Mathematics Hand book : M. Vygodsky, Mir, Moscow, 1975.
2. Applied Mathematics for Engineers and Physicists : Pipes & Harvill, London, McGraw Hill,1970.
3. Mathematics of Physics and Modern Engineering : Sokolnikoff & Recheffer
4. Fundamentals of mathematical Statistics: S. C. Gupta, V. K. Kapoor.
5. Algebra: Rajinderpal Kaur, First World Publication Ludhiana.

BHP-254 CHEMISTRY-IV

Time: 3 Hours   **Total Marks:50**
                                              (Max. Marks: 40+Internal Assessment: 10)
Total Lectures: 60   **Pass Marks: 35%**
Instructions for the Paper Setters:
There will be five sections. Section A will consist of Eight Short Answer Type questions covering the whole syllabus and is compulsory. Sections B, C, D and E will consist of two questions each. The candidates are required to attempt one from each Section. All questions carry equal marks.

UNIT – I

1. Energy and Electromagnetic Spectrum   **5 Hrs**

Introduction, electromagnetic spectrum and Units, Regions of the spectrum, Basic features of different spectrometers, Statement of Born-Oppenheimer approximation, Degree of freedom, Frank Condon Principle, Fluorescence and Phosphorescence.

II. Ultraviolet and Visible Spectroscopy   **6 Hrs**

The energy of electronic excitation, Measurement techniques, Beer-Lambert Law, Molar extinction coefficient. Different types of transition noticed in UV spectrum of organic functional groups and their relative energies. Chromophore, Auxochromes, Absorption and intensity shifts, Transition probability. Factors affecting λ_{max} , Effect of steric hindrance to coplanarity, Solvent effects.

UNIT – II

III. Infrared Spectroscopy   **5 Hrs**

Vibrational energy levels, Selection rules, Force constant, Fundamental vibration frequencies, Factors influencing Vibrational Frequencies (Vibrational Coupling, Hydrogen Bonding, Electronic effect, Bond Angles, Field Effect) of different functional groups. Sampling techniques.

IV. Applications of UV and IR Spectroscopy   **7 Hrs**

Applications of UV spectroscopy, Woodward Fieser rules for calculating λ_{max} of conjugated polyenes and α,ß -unsaturated carbonyl compounds. Applications of IR spectroscopy, Absorption of Common functional Groups, Interpretation of simple IR spectra, Finger print regions. Simple numerical problems based on UV and IR spectroscopy.

UNIT-III

V. Proton Magnetic Resonance spectroscopy (^{1}H NMR)   **6 Hrs**

The Nuclear spin, Larmor frequency, the NMR isotopes, Population of nuclear spin level, Spin and Spin lattice relaxation. Measurement techniques (CW & FT method), Solvent used. Chemical shift, Reference compounds, Shielding constant, Range of typical chemical Shifts, Simple application of chemical shifts, Anisotropic effect. Spin spin splitting, Coupling constant.

VI. Applications of NMR spectroscopy   **5 Hrs**

NMR spectra with various examples such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene, o-, m-, p- anisidine, o-, m-, p- nitrophenols, acetophenone. Simple numerical of structure elucidation of NMR spectroscopic data.

UNIT- IV

VII. Mass Spectrometery   **5 Hrs**

Basic Principles. Elementary theory. Molecular ions, isotope ions, Fragment ions of odd and even electron types, Nitrogen rule, Factors affecting cleavage patterns, Simple cleavage, Cleavages at a hetero atom, Multicentre fragmentations, Rearrangements, Diels – Alder fragmentation, Mc Lafferty rearrangement.

VIII. Applications of Mass Spectroscopy   **6 Hrs**

Cleavage associated with common functional groups , Aldehydes, Ketones, Cyclic and Acyclic Esters, Alcohols, Olefins, Aromatic compounds, Amines, Interpretation of the spectrum of unknown simple molecules.

Books Recommended:

1. Organic Spectroscopy By W. Kemp; Publisher- Palgrave, New York

2. D.H. Williams and I. Fleming. Spectroscopic Methods in Organic Chemistry.

3. Spectrometric Identification of Organic Compounds - R.M. Silverstein & F. X. Webster; Publisher: John Willey and Sons,Inc.

4. Introductory Problems in Spectroscopy- By R.C. Banks, E.R. Matjeha and G. Mercer; Publisher : The Benzamine / Cummings Publishing Company Inc.

5. Introduction to Spectroscopy – D. L. Pavia, G. M .Lampman, and G. S. Kriz Publisher: Brooks / Cole, a part of cengage learning

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-255 ENVIRONMENTAL STUDIES-II (COMPULSORY)

Time: 3 Hrs.   **Max. Marks: 50**

(Max. Marks: 40 + Internal Assessment: 10)

Theory Lectures: 1½ Hours/ Week

Section–A: (12 Marks): It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying four marks. Answer to any of the questions should not exceed two pages.

Section–B: (16 Marks): It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying eight marks. Answer to any of the questions should not exceed four pages.

Section–C: (12 Marks): It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

1. Biodiversity and its Conservation:

- Definition: Genetic, species and ecosystem diversity.

- Biogeographical classification of India.

- Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option

- Values.

- Biodiversity of global, National and local levels.

- India as mega-diversity nation.

- Hot-spots of biodiversity.

- Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts.

- Endangered and endemic species of India.

- Conservation of Biodiversity: In situ and Ex-situ conservation of biodiversity.

2. Environmental Pollution:

- Definition, causes, effects and control measures of:

    a) Air Pollution

b) Water Pollution

c) Soil Pollution

d) Marine Pollution

e) Noise Pollution

f) Thermal Pollution

g) Nuclear Hazards

h) Electronic Waste

- 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.

3. Human Population and the Environment

- Population growth, variation among nations.

- Population explosion-Family welfare programme.

- Environment and human health.

- Human rights.

- Value education.

- HIV/AIDS.

- Women and child welfare.

- Role of information technology in environment and human health.

- Case studies.

- Road Safety Rules & Regulations**:** Use of Safety Devices while Driving, Do's and Don'ts

- while Driving, Role of Citizens or Public Participation, Responsibilities of Public under

- Motor Vehicle Act, 1988, General Traffic Signs.

- Accident & First Aid**:** First Aid to Road Accident Victims, Calling Patrolling Police &

- Ambulance.

4. National Service Scheme:

- **Entrepreneurship Development:** Definition & Meaning; Qualities of good entrepreneur; Steps/ ways in opening an enterprise; Role of financial and support service Institutions.
- **Civil/Self Defense:** Civil defense services, aims and objectives of civil defense; Needs for self-defense training.

5. Field Visits:

- Visit to a local area to document environmental assets–river/forest/grassland/hill/mountain.
- Visit to a local polluted site–Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems–pond, river, hill slopes etc.
- Contribution of the student to NSS/any other social cause for service of society.

Note: In this section the students will be required to visit and write on the environment of an area/ ecosystem/vi1lage industry/disaster/mine/dam/agriculture field/waste management/hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.

2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.

3. Down to Earth, Centre for Science and Environment, New Delhi.

4. Jadhav, H. &Bhosale, V. M. 1995. Environmental Protection and Laws.Himalaya Pub.

5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson

Education (Singapore) Pte. Ltd., Delhi.

6. Kaushik, A. &Kaushik, C. P. 2004. Perspective in Environmental Studies,

New Age International (P) Ltd, New Delhi.

7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.

8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.

9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex,

Amritsar

10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

SYLLABUS FOR B.Sc. (HONS.) PHYSICS (2017-18)

BHP-256 INTERDICIPLINARY COURSE ID-II

Geography

Time: 3 Hours   **Total Marks: 50**
                                                      Theory: 30 Marks
                                                      Internal Assessment: 10 Marks
Total Lectures: 60   **Practical: 10 Marks**

Section A: - It will consist of 10 questions from the entire syllabus. All questions are compulsory. Each question will carry one mark; the total weightage being 10 marks.
                                                      (10x1=10 Marks)
Section B: - It will consist of 8 short answer questions upto100 words in length. The students will be required to attempt any 5 questions. Each question will carry 4 marks; the total weightage being 20 marks.   **(5x4=20 Marks)**

Section C: - There will be a Practical file work.

Part A: Physical Geography

1. Exploring the Earth: The shape of the Earth, The Earth's movements, Day and Night, The Earth's Revolution, Dawn and Twilight, Latitude and Longitude, Longitude and Time, Standard Time and Time Zones, The International Date line.
2. The Earth's Crust: The Structure of the Earth, Classification of Rocks, (Igneous, Sedimentary and Metamorphic), Types of Mountains, Types of Plateau, Types of Plains.
3. The Oceans: The movements of Ocean currents, The Indian Ocean circulation

Part B: Weather, Climate and Vegetation

1. Weather: The Difference between Climate and Weather, The Elements of Weather and Climate, Rainfall, Pressure, Temperature and Humidity, Winds, Sunshine.
2. Climate: The Atmosphere, Insulation, Elements of Climate and Factors affecting them, Temperature, Factors affecting temperature, Precipitation, Rainfall, Monsoon.
3. Vegetation: Climatic Types and Natural vegetation, World Climatic Types.

Part C: Practical Work

1. Maps: Physical (India & World), Types of soil (India), Monsoon.
2. Maps: Vegetation (India), Rainfall (World & India), Natural calamities (last 6 months) viz. Earthquake, Flood, Cyclone, Tsunami, Land slide.

Prescribed Text:
        a. Certificate Physical & Human Geography by G.C. Leong
        b. Oxford India Atlas (Latest Edition)
        a. Spectrum- Geography & India

BHP-257 PHYSICS LAB-IV

General Guidelines for Practical Examination

Time: 3 Hours **Total Marks: 50**
(Max. Marks: 40 + Internal Assessments: 10)
Pass Marks: 35%

Periods 8 Periods/week
I. The distribution of marks is as follows:

i) One experiment **20 Marks**

ii) Brief Theory **5 Marks**

iii) Viva–Voce **10Marks**

iv) Record (Practical file) **5 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

12. To determine refractive index of glass and liquid using spectrometer.
13. To determine the Cauchy's constants.
14. To study the refractive index of a doubly refracting prism.
15. To set up Newton's rings to determine wavelength of sodium light.
16. To determine the wavelength by using plane diffraction grating (Use Hg source)
17. To determine dispersive power of plane diffraction grating.
18. To determine resolving power of a telescope.
19. To determine resolving power of a grating.
20. To measure an accessible (Horizontal and vertical) height using sextant.
21. To measure inaccessible height by using sextant.
22. Verify laws of probability distribution by throwing of similar coins.
23. To study the absorption spectra of iodine vapours.
24. To study the rotation of plane of polarization by using polarimeter.
25. To determine the specific rotation of sugar using Laurent's half shade polarimeter

Reference Books:

1 Practical Physics Volume-II, T.S. Bhatia, Gursharan Kaur, Iqbal Singh, Vishal Publications

2 Practical Physics, C.L. Arora, S. Chand & Co.

BHP-258 CHEMISTRY LAB-IV

Physical Chemistry

Time: 3 Hours   **Total Marks: 50**
                                      (Max. Marks: 40 + Internal Assessment: 10)
6 Periods/week   **Pass Marks: 35%**

Note. The question paper will be set by the examiner based on the syllabus.

1.   Refractometry: Determine refractive index of a given liquid as a criterion for its purity. (Benzene i.e. commercial) benzene + A.R. acetone).

2.   Polarimetry: Determine the %age composition of an optically active solution.

3.   Calorimetry:
        a) Determination of Heat of neutralization
                (i) Strong acid-strong base
                (ii) Weak acid-strong base.
         b) Determination of Heat of solution of KCl, NH_4Cl, KNO_3

4.   Conductometry:
        a) Determination of cell constant.
        b) Determination of specific and equivalent conductance of electrolyte
          (NaCl andHCl).
        c) Precipitation titration of Na_2SO_4 vs. $BaCl_2$.
        d) Neutralization titrations NaOH vs. HCl and NaOH vs. CH_3COOH.

5.   Determination of adsorption isotherm of oxalic acid on charcoal.