B.Sc. PHYSICS
SCHEME OF EXAMINATION
Semester III

Paper I- PHY 301 : Computer Programming, Thermodynamics

Max. Marks : 45
Internal Assessment : 10
Time : 3 Hrs.

NOTE :
1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Computer Programming : Computer organisation, Binary representation, Algorithm development, flow charts and their interpretation.
Fortran Preliminaries; Integer and floating point arithmetic expression, built in functions executable and non-executable statements, input and output statements, Formats, IF, DO and GO TO statements, Dimension, arrays statement, function and function subprogram.

Unit-II

Thermodynamics-I : Second law of thermodynamics, Carnot theorem, Absolute scale of temperature, Absolute Zero, Entropy, show that dQ/T=O, T-S diagram Nernst heat law, Joule's free expansion, Joule Thomson (Porous plug) experiment. Joule - Thomson effect.Liquefication of gases. Air pollution due to internal combustion Engine.

Unit-III

Thermodynamics-II : Derivation of Clausius - Claperyron latent heat equation. Phase diagram and triple point of a substance. Development of Maxwell thermodynamical relations. Application of Maxwell relations in the derivation of relations between entropy, specific heats and thermodynamic variables. Thermodynamic functions : Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them.

References :

1. Rajaraman, Fortran Programming.
2. Schaum Series, Fortran 77.
3. Ram Kumar, Programming with Fortran - 77.
4. S. Lokanathan and R.S., Gambir, Statistical and Thermal Physics (An Introduction), Prentice Hall of India, Pvt., Ltd. (1991, New Delhi).
5. J.K. Sharma and K.K. Sarkar, Thermodynamics and statistical Physics, Himalaya Publishing House (1991, Bombay.)
6. M.W. Zemansky and R. Dittman, Heat and Thermodynamics, McGraw Hill, New York (1981).

B.Sc. PHYSICS
Paper-II PHY 302
Optics – I

Max. Marks : 45
Internal Assessment : 10
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Fourier Analysis and Fourier Transforms : Speed of transverse waves on a uniform string. Speed of longitudinal waves in a fluid, superposition of waves (physical idea), Fourier Analysis of complex waves and its application for the solution of triangular and rectangular waves, half and full wave rectifier out puts. Fourier transforms and its properties. Application of fourier transform to following function.

(I) $f(x) = e^{-x2/2}$

(II) $f(x) = I\ [x] < a$
$0\ [x] > a$

Unit-II

Geometrical Optics : Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses, Chromatic, spherical coma, astigmatism and distortion aberrations and their remedies.

Unit-III

Physical Optics: Interference, Interference by Division of Wavefront : Fresnel's Biprism and its applications to determination of wave length of sodium light and thickness of a mica sheet, Lioyd's mirror, phase change on reflection.

References

1. Mathematical Physics by B.S. Rajput and YogPrakashPragati Prakashan.
2. Theory and Problems of Laplace Transforms by Murrari R. spiegel, McGraw Hill Book Company.
3. Optics by Ajay Ghatak, Tata McGraw Hill 1977.
4. Introduction of Optics by Frank L. Pedrotti and Leno S. Pedrotti, Prentice Hall 1987.

B.Sc. PHYSICS

Paper-III Phy- 303
Practicals

Max. Marks : 40
Time : 3 Hrs.

Special Notes

1. Do any eight experiments.
2. The students are required to Calculate the error involved in a particular experiment (Percentage error).

Note:-

1. The practical examination will be held in two sessions of 3 hours.
2. Distribution of Marks :

Experiments :	=	20 Marks
Viva-Voce :	=	10 Marks
Lab. Record :	=	10 marks
Total		40 Marks

For Giving marks under Lab. Record each college will maintain practical assessment record by using the following procedure.

1. After the completion of a practical the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note book. These marks will contribute the lab Record.
2. To complete the final marks for lab. Record a separate register for each class of B.Sc. will be maintained. The students will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average the total marks obtained will be divided by the total no. of required practicals, instead of the number of practicals performed by the student. This record will be signed by the concerned teacher.
3. The Lab. Record register will be presented to the external practical examiners for lab. Record marks. The external examiner will verify the record randomly.

B.Sc. PHYSICS
Paper III- PHY 303
PRACTICALS

Max. Marks : 40
Time : 3 Hours

1. To measure the (a) area of a window (b) height of an inaccesible object.
2. Refractive index and dispersive power of a prism material by spectrometer.
3. To draw a graph between wave length and minimum deviation for various lines from a Mercury discharge source.
4. Determination of wave length of Na light and the number of lines per centimeter using a diffraction grating.
5. Wave length of Na light by Newton's Rings.
6. Resolving power of a telescope.
7. Comparision of Illuminating Powers by a Photometer.
8. Measurement of (a) Specific rotation (b) concentration of sugar solution usingpolarimeter.
9. Ordinary and extra ordinary refractive indices for calcite or quartz.
10. To find the equivalent focal length of a lens system by nodal slide assembly.

B.Sc. PHYSICS
SCHEME OF EXAMINATION
Semester IV

Paper I- PHY 401 : Statistical Mechanics

Max. Marks : 45
Internal Assessment : 10
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Probability, some probability considerations, combinations possessing maximum probability, combinations possessing minimum probability, distribution of molecules in two boxes. Case with weightage (general). Phase space, microstates and macrostates, statistical fluctuations, constraints and accessible States. Thermodynamical probability.

Unit-II

Postulates of Statistical Physics. Division of Phase space into cells, Condition of equilibrium between two system in thermal contact. b-Parameter. Entropy and Probability, Boltzman's distribution law. Evaluation of A and b. Bose-Einstein statistics, Application of B.E. Statistics to Plancks's radiation law, B.E. gas.

Unit-III

Fermi-Dirac statistics, M.B. Law as limiting case of B.E. Degeneracy and B.E., Condensation. F.D. Gas, electron gas in metals. Zero point energy. Specific heat of metals and its solution.

References

1. B.B. Laud, "Introduction to Statistical Mechanics" (Macmillan 1981).
2. F. Reif, "Statistical Physics' (McGraw Hill 1988).
3. K. Huang, "Statistical Physics" (Wiley Eastern 1988).

B.Sc. PHYSICS
Paper-II PHY 402
Optics – II

Max. Marks : 45
Internal Assessment : 10
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Interference by Division of Amplitude :Colour of thin films, wedge shaped film, Newton's rings. Interferometers: Michelson's interferometer and its application to (I) Standardisation of a meter (II) determination of wave length. Fresnel's Diffraction : Fresnel's half period zones, zone plate, diffraction at a straight edge, rectangular slit and circular apperture.

Unit-II

Fraunhoffer diffraction : One slit diffraction, Two slit diffraction, N-slit diffraction, Plane transmission granting spectrum, Dispersive power of a grating, Limit of resolution, Rayleigh's criterion, resolving power of a telescope and a grating.

Unit-III

Polarization :Polarisation and Double Refraction, Polarisation by reflection, Polarisation by scattering, Malus law, Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of Palorised light :Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii)Elliptically polarized light, Optical activity, Fresnel's theory of rotation, Specific rotation, Polarimeters (half shade and Biquartz).

References

1. Optics by Ajay Ghatak, Tata McGraw Hill 1977.
2. Introduction of Optics by Frank L. Pedrotti and Leno S. Pedrotti, Prentice Hall 1987.

B.Sc. PHYSICS
Paper-IV Phy- 403
Practicals

Max. Marks : 40
Time : 3 Hrs.

Special Notes

1. Do any eight experiments.
2. The students are required to Calculate the error involved in a particular experiment (Percentage error).

Note:-

1. The practical examination will be held in two sessions of 3 hours.
2. Distribution of Marks :

Experiments :	=	20 Marks
Viva-Voce :	=	10 Marks
Lab. Record :	=	10 marks
Total		40 Marks

For Giving marks under Lab. Record each college will maintain practical assessment record by using the following procedure.

1. After the completion of a practical the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note book. These marks will contribute the lab Record.
2. To complete the final marks for lab. Record a separate register for each class of B.Sc. will be maintained. The students will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average the total marks obtained will be divided by the total no. of required practicals, instead of the number of practicals performed by the student. This record will be signed by the concerned teacher.
3. The Lab. Record register will be presented to the external practical examiners for lab. Record marks. The external examiner will verify the record randomly.

B.Sc. PHYSICS
Paper IV- PHY 403
PRACTICALS

Max. Marks : 40
Time : 3 Hours

Note:- This course will contain two parts (i) Electronics and (ii) Computer experiments. Students have to perform a minimum of four experiments from each part.

(i) Electronics

1. To draw common base and common emitter characteristics of a transistor and calculate transistor and calculate transistor characteristics parameters.
2. To study the ripple factor in a.d.c. power supply.
3. To draw frequency response curve of transistorised R.C. coupled amplifier.
4. To find out the frequency of a tuning fork by Melde's experiment.
5. Study of series and parallel resonance circuits.
6. Electronic Voltmeter, measurement of peak, average & R.M.S. valus of signal.
7. Study of voltage doubler and trippler circuits.

(ii) Computer Experiments

1. To print out all natural (even/odd) number between given limits using computer.
2. To find maximum, minimum and range of a given set of numbers using computer.
3. To evaluate sum of finite series. For example, S=.
4. Find the roots of a quadratic equation.
5. To find intergration of a definite integral by trapezoidal rule.
6. To find the area of a triangle, sphere and cylinder.
7. Given value for a,b,c and d and a set of values for the variable x evaluate the function defined by

   $F(x)= ax^2+bx+c$ if $x<d$

   $F(x)= O$ if $x=d$

   $F(x)= ax^2+bx-c$ if $x>d$

   For each value of x, and print the value of x and F(x). Write a program for an arbitrary number of x values