APPENDIX – 24 (R)
UNIVERSITY OF MADRAS
CHOICE BASED CREDIT SYSTEM
B.Sc. DEGREE COURSE IN PHYSICS
(MODIFIED SCHEME OF EXAMINATIONS)
w.e.f.2013-14

FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course Components</th>
<th>Name of the Subjects</th>
<th>Ins. Hours</th>
<th>Credit</th>
<th>Exam Hours</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART I</td>
<td>Language Paper II</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>PART II</td>
<td>English Paper II</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>PART III</td>
<td>Core I – Mechanics and Properties of Matter</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Core III – Major Practical I</td>
<td>3</td>
<td>2</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Allied Paper I – Theory</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Practical</td>
<td>3</td>
<td>2</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>PART IV</td>
<td>1(a) Basic Tamil I (or)</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>1(b) Adv. Tamil I (or)</td>
<td></td>
<td>2</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>1(c) Non-major elective I</td>
<td></td>
<td>2</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>2. Skill based elective I</td>
<td></td>
<td>2</td>
<td>3</td>
<td>40</td>
</tr>
</tbody>
</table>

SECOND SEMESTER

<table>
<thead>
<tr>
<th>Course Components</th>
<th>Name of the Subjects</th>
<th>Ins. Hours</th>
<th>Credit</th>
<th>Exam Hours</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART I</td>
<td>Language Paper II</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>PART II</td>
<td>English Paper I</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>PART III</td>
<td>Core II – Thermal Physics and Acoustics</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Core III – Major Practical I</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Allied Paper II – Theory</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Practical</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td>PART IV</td>
<td>1(a) Basic Tamil II (or)</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>1(b) Adv. Tamil II (or)</td>
<td></td>
<td>2</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>1(c) Non-major elective II</td>
<td></td>
<td>2</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>2. Skill based elective II</td>
<td></td>
<td>2</td>
<td>3</td>
<td>40</td>
</tr>
</tbody>
</table>

** - Practical Examination at the end of even semester

ALLIED SUBJECTS:
1. Maths - I
2. Maths - II
3. Chemistry - I
4. Chemistry - II
APPENDIX - 24(S)

UNIVERSITY OF MADRAS
CHOICE BASED CREDIT SYSTEM

B.Sc. DEGREE COURSE IN PHYSICS

REVISED SYLLABUS
(w.e.f.2013-14)

II YEAR FOURTH SEMESTER CREDIT : 5

CORE PAPER V - ATOMIC PHYSICS

Unit 1 : Discharge Phenomenon Through Gases:
    Moving of a charge in transverse electric and magnetic fields - specific charge of an
electron - Dunnington's method - positive rays – Aston’s, Dempster's mass spectrographs.

Unit 2 : Photo-electric Effect:
    Richardson and Compton experiment - Laws of photoelectric emission - Einstein photo
electric equation - Millikan's experiment - verification of photoelectric equation - photo electric
cells - photo emissive cells - photovoltaic cell - photo conducting cell - photomultiplier.

Unit 3 : Atomic Structure:
    Bohr and Sommerfeld atom models - Vector atom model - Pauli's exclusion principle -
exploration of periodic table - various quantum numbers - angular momentum and magnetic
moment - coupling schemes - LS and JJ coupling - special quantisation - Bohr magnetron - Stern
and Gerlach experiments.

Unit 4 : Ionisation Potential and Splitting of Energy Levels:
    Excitation and ionization potential – Frank and Hertz’s experiment - Davis and
Goucher's method. Spectral terms and notions - selection rules - intensity rule and interval rule -
fine structure of sodium D lines - alkali spectra - fine structure of alkali spectra - spectrum of
Helium - Zeeman effect - Larmor's theorem - Debye's explanation of normal Zeeman effect.
Anamalous Zeeman effect - theoretical explanation. Lande's 'g' factor and explanation of
splitting of D1 and D2 lines of sodium. Paschen-Back effect - Stark effect (qualitative study
only).

Unit 5 : X-Rays:
    Bragg's law - X-ray spectroscopy - characteristic X-ray spectra - satellite and Auger
effect - continuous X-ray spectra - X-ray absorption and fluorescence - Moseley's law - uses of
X-rays - Compton effect - experimental verification of Compton effect.

Books for Study :
III YEAR  FIFTH SEMESTER  CREDIT : 5

CORE PAPER VII - ELECTRICITY AND ELECTROMAGNETISM

Unit 1: Chemical Effects of Electric Current:

Unit 2: DC Circuits:
Growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitor - growth and decay of charge in an LCR circuit - condition for the discharge to be oscillatory - frequency of oscillation - network analysis - Thevenin and Norton's Theorems.

Unit 3: AC Circuits:
AC Voltage and current - Power factor and current values in and AC circuit containing LCR circuit - series and Parallel resonant circuits - AC motors - single phase, three phase - star and delta connections - electric fuses - circuit brakers.
Unit 4 : Magnetic Effect of Electric Current:
Biot and Savart's law - magnetic field intensity due to a solenoid carrying current - effect of iron core in a solenoid - Helmholtz galvanometer - moving coil ballistic galvanometer - theory - damping correction - determination of the absolute capacity of a condenser using B.G.

Unit 5 : Electromagnetic Induction and Its Applications:

Books for Study:
2. Electricity and Magnetism by Brijlal and Subrahmanyam; S.Chand & Co., New Delhi, (2000).

Books for Reference:

Web Site :http://www2.warwick.ac.uk/fac/sci/physics/teach/ module-home/px207.

Core – III : Practical - I

(At the end of the Second semester - Any Fifteen Experiments)

1. Young’s modulus – Non-uniform bending – Pin & microscope
2. Young’s modulus – Uniform bending – Optic lever
3. Rigidity modulus – Torsional pendulum (without identical masses)
4. Rigidity modulus and moment of inertia – Torsional pendulum (With identical masses)

5. Surface tension and interfacial surface tension – drop weight method

6. Coefficient of viscosity of liquid – Graduated burette (radius of capillary tube by Mercury pellet method)

7. Sonometer – Verification of laws and frequency of tuning fork

8. Sonometer – Relative Density of a solid and liquid

9. Specific heat capacity of a liquid – Newton’s law of cooling

10. Specific heat capacity of liquid – Method of mixtures (Half-time correction)

11. Focal length, Power, R and refractive index of a long focus convex lens

12. Focal length, Power, R and refractive index of a concave lens

13. Spectrometer – refractive index of a liquid

14. P.O. Box – Temperature coefficient of resistance

15. Potentiometer – Calibration of low range voltmeter

16. Potentiometer – Internal resistance

17. Carey Foster bridge - Specific resistance of the given wire

Note : Use of Digital balance is permitted

Core Paper – VI : Practical - II

(At the end of Fourth semester - Any Fifteen Experiments)

1. Young's modulus - cantilever - depression - (Static method - Scale and telescope)
2. Rigidity modulus - Static torsion
3. Compound pendulum - g and k
4. Sonometer - A.C. Frequency - Steel and Brass wires
5. Melde's string - frequency, Relative Density of a solid and liquid
6. Thermal conductivity of a bad conductor - Lee's disc method
7. Spectrometer - μ of a glass prism - i-d Curve
8. Spectrometer - Grating N and λ - minimum deviation method
9. Air wedge - Thickness of a wire
10. m and B_H - deflection mangetometer Tan C position and vibration magnetometer
11. Carey Foster bridge - Temperature coefficient of resistance of a coil
12. Potentiometer – Specific resistance of the given wire
14. Figure of merit of galvanometer (Mirror or Table Galvanometer)
15. Comparison of emfs of the given cells using B.G.
16. Comparison of capacitances of the given capacitors using B.G.

17. * C.R.O. Study of wave forms - Lissajou's figures - frequency determination
18. * Study of resistors, Choke, capacitors and transformer
20. * Two transistor Radio receiver

* Not for Examination

Core Paper – XIII : Practical - III

(At the end of Sixth Semester - Any Fifteen Experiments)

1. Young's modulus - Non uniform Bending - Koenig's method.
3. Spectrometer - Small angled prism - Normal incidence and emergence refractive index of the material of prism.
4. Spectrometer - (i - i’) curve - refractive index.
5. Spectrometer - Cauchy’s constant.
7. Spectrometer – Grating N and λ - Normal incidence method
8. Field along axis of a circular coil - Deflection magnetometer - B_H and M.
9. Field along axis of a circular coil - vibration magnetic needle - B_H.
10. Potentiometer - Calibration of high range voltmeter
11. Potentiometer - Temp coeff. of resistance of a thermistor
13. Thermo emf - Mirror galvanometer (or) spot galvanometer
14. B.G - Figure of merit (quantity of charge)
15. B.G - Internal resistance of a cell
16. B.G - High Resistance by leakage
17. B.G - Absolute capacitance
18. B.G - Comparison of mutual inductances
19. B.G - Absolute mutual inductance

ALLIED PHYSICS – PRACTICALS
(At the end of even semester - Any Fifteen Experiments)

1. Young’s Modulus by Non-uniform bending using Pin and Microscope
2. Young’s Modulus by Non-uniform bending using Optic lever – Scale and telescope
3. Rigidity modulus by Static torsion method
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial tension – Drop Weight method
6. Comparison of viscosities of two liquids – Burette method
7. Specific heat Capacity of a liquid – Half time correction
8. Sonometer – Determination of a.c frequency
9. Newton’s rings - Radius of curvature
10. Air wedge – Thickness of a wire
11. Spectrometer – Grating – Wavelength of Mercury lines – \textbf{Minimum deviation method}

12. Potentiometer – Voltmeter Calibration

13. P.O. Box – Specific resistance

14. B.G. – Figure of merit

15. Construction of AND, OR, NOT gates – using diodes and Transistor

16. Zener Diode – Characteristics

17. NAND gate as a universal gate

\textbf{Note :} Use of Digital Balance Permitted

The following procedure is to be followed for internal marks (40 marks):

\begin{itemize}
  \item Attendance : 5 marks
  \item Practical test – best 2 out of 3 : 30 marks
  \item Record : 5 marks
\end{itemize}

\textbf{Books for Study and Reference :}

1. Practical Physics by M.N.Srinivasan S. Chand & Co.,
2. Practical Physics by M.Arul Thalapathy Comptek Publishers

******************
**UNIVERSITY OF MADRAS**  
**CHOICE BASED CREDIT SYSTEM**


<table>
<thead>
<tr>
<th>Semester</th>
<th>Subject title</th>
<th>Common with the course</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Thermal Physics and Acoustics</td>
<td>Syllabus same as in B.Sc. Physics: Thermal Physics and Acoustics</td>
</tr>
<tr>
<td></td>
<td>Allied Paper II – Maths II</td>
<td>Syllabus same as in B.Sc. Physics: Allied Paper II- Maths II</td>
</tr>
<tr>
<td>III</td>
<td>Optics</td>
<td>Syllabus same as in B.Sc. Physics: Optics</td>
</tr>
<tr>
<td></td>
<td>Basic Electronics</td>
<td>Syllabus same as in B.Sc. Physics: Basic Electronics</td>
</tr>
<tr>
<td></td>
<td>Data Structures</td>
<td>Syllabus same as in B.Sc. Maths with Computer Applications : Data Stuctures</td>
</tr>
<tr>
<td></td>
<td>Object oriented Programming using C++</td>
<td>Syllabus same as in B.Sc. Maths with Computer Applications : Object oriented programming using C++</td>
</tr>
<tr>
<td>IV</td>
<td>Atomic Physics</td>
<td>Syllabus same as in B.Sc. Physics: Atomic Physics</td>
</tr>
<tr>
<td></td>
<td>Operating System</td>
<td>Syllabus same as in B.Sc. Maths with Computer Applications: Operating System</td>
</tr>
<tr>
<td>V</td>
<td>Nuclear and Particle Physics</td>
<td>Syllabus same as in B.Sc. Physics : Nuclear and Particle Physics.</td>
</tr>
<tr>
<td></td>
<td>Discrete Mathematics</td>
<td>Syllabus same as in B.Sc. Maths with Computer Applications : Discrete Mathematics</td>
</tr>
<tr>
<td></td>
<td>Programming in Java</td>
<td>Syllabus same as in B.Sc. Maths with Computer Applications : Programming in Java</td>
</tr>
<tr>
<td>VI</td>
<td>Electricity and Electromagnetism</td>
<td>Syllabus same as in B.Sc. Physics: Electricity and Electromagnetism</td>
</tr>
<tr>
<td></td>
<td>Relativity &amp; Quantum Mechanics</td>
<td>Syllabus same as in B.Sc. Physics: Relativity &amp; Quantum Mechanics</td>
</tr>
<tr>
<td></td>
<td>Elective II – Microprocessor</td>
<td>Syllabus same as in B.Sc. Physics: Microprocessor</td>
</tr>
<tr>
<td>Fundamentals</td>
<td>Fundamentals</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>Note: The only paper with a different syllabus in B.Sc. Physics with Computer Applications (Semester VI) is: Mathematical &amp; Numerical methods.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>