DEPARTMENT OF PHYSICS

ABHEDANANDA MAHAVIDYALAYA

ACADEMIC PLAN (SUGGESTIVE) FOR B.SC (HONS)

Semester: - II (From January 2018 - June 2018)

Course: - (AECC – 2) - Communicative English/MIL
CC-III : Electricity and Magnetism
CC-IV : Waves and Optics
GE-2: ELECTRICITY AND MAGNETISM

Total Marks: - 75 (for each Course) Theory 40, Practical 20 and Internal assessment 15

Total Credit: - 6 (for each Course) Theory 4 & Practical 2

Total No. of Lectures: - Theory 60 & Laboratory 60 (for each Course)

Objectives: - To have a tentative course of action well in advance through the said Academic Plan to be able to: -

- Execute the new CBCS with ease
- Finish syllabus and conduct evaluations due time to the satisfaction of both the students and teachers.

Evaluation Method: -

C 1 – 10% of total marks (class test/ assignment/ seminar + class attendance)
C 2 - 10% of total marks (class test/ assignment/ seminar + class attendance)
C 3 – 80% of total marks (60) i.e. Theory 40 marks [(10x2) + (5x2) + (2x5)] and Practical 20 marks semester- end Examination.

For C 1

Classes begin from 2nd week of January 2018
1/3 of the total syllabus of CC3 should be completed before C1
8th week from the beginning of the semester

FOR C2

2/3 of the total syllabus of CC3 should be completed before C2
16th week from the beginning of the semester

FOR C3

Total syllabus of CC3 should be completed before C3
22th to 24th week from the beginning of semester

SYLLABUS OF CC-III : Electricity and Magnetism Follow the Burdwan University website
CC-IV : Waves and Optics Do

GE 2: ELECTRICITY AND MAGNETISM Do

ACADEMIC PLAN FOR SEMESTER II

FOR CC-III: ELECTRICITY AND MAGNETISM

For C 1

- Classes begin from 2nd week of January 2018
- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- 1/3 of the total syllabus of CC3 should be completed before C1
- Tentative no. of lectures and syllabus covered before C 1

Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-

(a): - Theory (6 lectures)

Name of the Teacher: -PROF. SHYAMAL BARAN DUTTA :-

(a): - Theory (7 lectures)
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. JAYANTA KUMAR BAL

(b): - Practical (10 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH

b): - Practical (10 lectures)

Name of the Teacher: - Dr. ANUPAM SARKAR

(a): - Theory (7 lectures)

FOR C-2

- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- 2/3 of the total syllabus of CC1 should be completed before C2
- Tentative no. of lectures and syllabus covered before C 2

Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-

(a): - Theory (6 lectures)

Name of the Teacher: -PROF. SHYAMAL BARAN DUTTA :-

(a): - Theory (7 lectures)
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. JAYANTA KUMAR BAL
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
b): - Practical (10 lectures)

Name of the Teacher: - Dr. ANUPAM SARKAR
(a): - Theory (7 lectures)

FOR C-3

- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- Total syllabus of CC1 should be completed before C3
- Tentative no. of lectures and syllabus covered before C 3

Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-
(a): - Theory (6 lectures)
Name of the Teacher: -PROF. SHYAMAL BARAN DUTTA :-

(a): - Theory (7 lectures)
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. JAYANTA KUMAR BAL
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
b): - Practical (10 lectures)

Name of the Teacher: - Dr. ANUPAM SARKAR
(a): - Theory (7 lectures)

CC- IV: WAVES AND OPTICS

For C 1

- Classes begin from 2nd week of January 2018
- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- 1/3 of the total syllabus of CC3 should be completed before C1
- Tentative no. of lectures and syllabus covered before C 1

Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. JAYANTA KUMAR BAL
(a): - Theory (7 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
(a): - Theory (7 lectures)
Name of the Teacher: - Dr. ANUPAM SARKAR
(b): - Practical (10 lectures)
Name of the Teacher: - Dr. ALAMGIR

(a): - Theory (6 lectures)
(b): - Practical (10 lectures)

FOR C-2

- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- 2/3 of the total syllabus of CC1 should be completed before C2
- Tentative no. of lectures and syllabus covered before C 2

Name of the Teacher: - Dr. JAYANTA KUMAR BAL
(a): - Theory (7 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
(a): - Theory (7 lectures)
Name of the Teacher: - Dr. ANUPAM SARKAR
(b): - Practical (10 lectures)
Name of the Teacher: - Dr. ALAMGIR

(a): - Theory (6 lectures)
(b): - Practical (10 lectures

FOR C-3

- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- Total syllabus of CC1 should be completed before C3
- Tentative no. of lectures and syllabus covered before C 3

Name of the Teacher: - Dr. JAYANTA KUMAR BAL
(a): - Theory (7 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
(a): - Theory (7 lectures)
Name of the Teacher: - Dr. ANUPAM SARKAR
(b): - Practical (10 lectures)
Name of the Teacher: - Dr. ALAMGIR

(a): - Theory (6 lectures)
(b): - Practical (10 lectures)

GE-II/CC-1B: ELECTRICITY AND MAGNETISM

For C 1

- Classes begin from 2nd week of January 2018
- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- 1/3 of the total syllabus of CC3 should be completed before C1
- Tentative no. of lectures and syllabus covered before C 1

  Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-
  (a): - Theory (6 lectures)
  Name of the Teacher: PROF SHYAMAL BARAN DUTTA
  (b): - Practical (10 lectures)

  Name of the Teacher: - Dr. JAYANTA KUMAR BAL
  (a): - Theory (3 lectures)
  (b): - Practical (10 lectures)

  Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
  (a): - Theory (7 lectures)
  (b): - Practical (10 lectures)

  Name of the Teacher: - Dr. ANUPAM SARKAR
  (b): - Practical (10 lectures)

  Name of the Teacher: - Dr. ALAMGIR

  (a): - Theory (4 lectures)
  (b): - Practical (10 lectures)

FOR C-2

- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- 2/3 of the total syllabus of CC1 should be completed before C2
- Tentative no. of lectures and syllabus covered before C 2

  Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-
  (a): - Theory (6 lectures)
  Name of the Teacher: PROF SHYAMAL BARAN DUTTA
  (b): - Practical (10 lectures)

  Name of the Teacher: - Dr. JAYANTA KUMAR BAL
  (a): - Theory (3 lectures)

(b): - Practical (10 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
(a): - Theory (7 lectures)
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. ANUPAM SARKAR
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. ALAMGIR

(a): - Theory (4 lectures)
(b): - Practical (10 lectures)

FOR C-3

- Number of lectures / week: - 6 lectures of 1 hour duration (6x1 = 6 hours) for theory and 6 lectures of 1 hour duration (6x1 = 6 hours) for Practical classes.
- Total syllabus of CC1 should be completed before C3
- Tentative no. of lectures and syllabus covered before C 3

Name of the Teacher: - Dr. TAPAN KUMAR PRAMANIK :-
(a): - Theory (6 lectures)
Name of the Teacher: PROF SHYAMAL BARAN DUTTA
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. JAYANTA KUMAR BAL
(a): - Theory (3 lectures)
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. PRADIP KUMAR GHOSH
(a): - Theory (7 lectures)
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. ANUPAM SARKAR
(b): - Practical (10 lectures)

Name of the Teacher: - Dr. ALAMGIR

(a): - Theory (4 lectures)
(b): - Practical (10 lectures)

CORE COURSE (HONOURS IN PHYSICS)

Semester II

CC- III: ELECTRICITY AND MAGNETISM
(Credits: Theory-04, Practicals-02)
F.M. = 75 (Theory - 40, Practical – 20, Internal Assessment – 15)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Seminar) – 05, Practical (Sessional Viva-voce) - 05]

FOR C1

TKP

Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem.Applications to dc circuits. (4 Lectures) Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping.Logarithmic damping.CDR. (3 Lectures)

SBD

Electromagnetic Induction: Faraday's Law. Lenz's Law.Self Inductance and Mutual Inductance.Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell‟s Equations. Charge Conservation and Displacement current. (6 Lectures)

AS

Electric field: Electric field lines. Electric flux.Gauss' Law with applications to charge distributions with
spherical, cylindrical and planar symmetry. (7 Lectures)

FOR C2

TKP

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges.Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. (6 Lectures)

SBD

Magnetic Properties of Matter: Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability.Relation between B, H, M. Ferromagnetism.B-H curve and hysteresis. (4 Lectures) Magnetic Field: Magnetic force between current elements and

definition of Magnetic FieldB. BiotSavart‟s Law and its simple applications: straight wire and circular loop. (3 Lectures)

AS

Conservative nature of Electrostatic Field.Electrostatic Potential.Laplace‟s and Poisson equations.The Uniqueness Theorem.Potential and Electric Field of a dipole. Force and Torque on a dipole. (7 Lectures)

FOR C3

TKP

Electrical Circuits: AC Circuits: Kirchhoff‟s laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3)Quality Factor, and (4) Band Width. Parallel LCR Circuit. (6 Lectures)

SBD

Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere‟s Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.
Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics (7 Lectures)

AS

Electrostatic energy of system of charges.Electrostatic energy of a charged sphere.Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors.Parallel-plate capacitor.Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. (7 Lectures)

CC- III : ELECTRICITY AND MAGNETISM
Practical:
For C1.

SBD, PKG &JKB

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DCCurrent, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine an unknown Low Resistance using Carey Foster‟s Bridge.
5. To compare capacitances using De'Sauty's bridge.

For C2.

SBD, PKG &JKB

6. Measurement of field strength B and its variation with distance using search coil.
7. To verify the Thevenin and Norton theorems.
8. To verify the Superposition, and Maximum power transfer theorems.
9. To determine self inductance of a coil by Anderson‟s bridge.

For C3.

SBD, PKG &JKB

10. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
11. To study the response curve of a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.
12. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer
13. Determine a high resistance by leakage method using Ballistic Galvanometer.
14. To determine the mutual inductance of two coils by Carey-Foster‟s method.
15. Construction of one ohm coil.

CC- IV: WAVES AND OPTICS

(Credits: Theory-04, Practicals-02)
F.M. = 75 (Theory - 40, Practical – 20, Internal Assessment – 15)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Seminar) – 05, Practical (Sessional Viva-voce) - 05]

Theory
FOR C1

PKG
Diffraction: Kirchhoff‟s Integral Theorem, Fresnel-Kirchhoff‟s Integral formula. (Qualitative discussion only) Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. (7 Lectures)

JKB
Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences. (7 Lectures)

ALG
Superposition of Two Harmonic Waves: Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment.Phase and Group Velocities.Changes with respect to Position and

Time.Energy of Vibrating String.Transfer of Energy.Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde‟s Experiment.Longitudinal Standing Waves and Normal Modes.Open and Closed Pipes. Superposition of N Harmonic Waves. (6 Lectures)

FOR C2

PKG

Multiple slits. Diffraction grating. Resolving power of grating. Fresnel Diffraction: Fresnel‟s Assumptions. Fresnel‟s Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. (7 Lectures)

JKB

Fresnel‟s Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses. Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves.Plane Progressive (Travelling) Waves.Wave Equation.Particle and Wave Velocities. Differential Equation.Pressure of a Longitudinal Wave.Energy Transport.Intensity of Wave. Water Waves: Ripple and Gravity Waves. (6 Lectures)

ALG

Wave Optics: Electromagnetic nature of light.Definition and properties of wave front.Huygens Principle.Temporal and Spatial Coherence. Interference: Division of amplitude and wavefront. Young‟s double slit experiment. Lloyd‟s Mirror and Fresnel‟s Biprism. Phase change on reflection: Stokes‟ treatment. (7 Lectures)

FOR C3

PKG

Fresnel diffraction pattern of a straight edge, a slit and a wire. Holography: Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves.Point source holograms. (7 Lectures)

JKB

Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe.Newton‟s Formula for Velocity of Sound.Laplace‟s Correction. Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. (6 Lectures)

ALG

Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton‟s Rings: Measurement of wavelength and refractive index.(6 Lectures)

CC- IV :WAVES AND OPTICS Practical :

FOR C1
TKP, AS & ALG

1. To investigate the motion of coupled oscillators.
2. To study Lissajous Figures.
3. Familiarization with: Schuster`s focusing; determination of angle of prism.

FOR C2
TKP, AS & ALG

4. To determine refractive index of the Material of a prism using sodium source.
5. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
6. To determine wavelength of sodium light using Fresnel Bi-prism.

FOR C3
TKP, AS & ALG

7. To determine wavelength of sodium light using Newton‟s Rings.
8. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
9. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
10. To determine dispersive power and resolving power of a plane diffraction grating.

Semester - II

GE-2/ CC-1B: ELECTRICITY AND MAGNETISM

(Credits: Theory - 04, Practical - 02) F.M. = 75 (Theory - 40, Practical – 20, Internal Assessment – 15)
Internal Assessment [Class Attendance (Theory) – 05, Theory (Class Test/ Assignment/ Seminar) – 05, Practical (Sessional Viva-voce) - 05]

Theory

FOR C1
ALG

Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance. (4 Lectures)

PKG

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss Theorem-Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. (7 Lectures)

JKB

Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current. (3 Lectures)

TKP
Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. (6 Lectures)

FOR C2

ALG

Vector Integration, Line, surface and volume integrals of Vector fields, Gaussdivergence theorem and Stoke's theorem of vectors (statement only). (4 Lectures)

PKG

Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. (7 Lectures)

JKB

Maxwell's equations, Poynting vector, energy density in electromagnetic field, (3 Lectures)

TKP
Magnetism: Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. (6 Lectures)

FOR C3

ALG
Divergence and curl of magnetic field.Magnetic vector potential. (4 Lectures)

PKG

Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric(7 Lectures)

JKB
electromagnetic wave propagation through vacuum and isotropic dielectricmedium, transverse nature of EM waves, polarization. (3 Lectures)

TKP
Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials. (6 Lectures)

CC-1B: ELECTRICITY AND MAGNETISM Practical:

FOR C1
SBD, PKG,AS, JKB & ALG

1. To use a Multimeter for measuring (a)Resistances, (b)AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2. Ballistic Galvanometer: (i) Measurement of charge and current sensitivity (ii) Measurement of CDR
3. To compare capacitances using De'Sauty's bridge.
4. To study the Characteristics of a Series RC Circuit.

FOR C2
SBD, PKG,AS, JKB & ALG

5. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor
6. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q
7. To determine a Low Resistance by Carey Foster's Bridge.
8. To verify the Thevenin and Norton theorem

FOR C3

SBD, PKG,AS, JKB & ALG

9. To verify the Superposition, and Maximum Power Transfer Theorem
10. To determine the horizontal component of earth's magnetic field.
11. To determine the resistance of a suspended coil galvanometer by half deflection method and hence calculate the sensitivity of the galvanometer.