CHOICE BASED CREDIT SYSTEM

(CBCS)

Guru Jambheshwar University of Science and Technology, Hisar

Revised Scheme and Syllabi
for

Undergraduate Course:

B. SC. PHYSICAL SCIENCES

(PHYSICS/GEOGRAPHY, CHEMISTRY/ ELECTRONICS/ COMPUTER SCIENCE/ COMPUTER APPLICATIONS, MATHEMATICS)

Under
The Faculty of Physical Sciences and Technology

w.e.f. Academic Session 2018-19

The Revised/consolidated scheme and syllabi of First Year of B.Sc. (Physical Sciences: Physics/Geography, Chemistry/Electronics/Computer Science/Computer Applications, Mathematics) as approved by the competent authority is as under:

Semester-I

Paper Code	Course opted	Nomenclature	Credits	Hr/ week	Marks		
					Ext.	Int.	Total
CXL- 101	Language Skills Compulsory Course-I	English-I	2	2	80	20	100
CPL- 102	Core Course-I (Physics)	Mechanics-I	2	2	80	20	100
CPL- 103	Core Course-II (Physics)	Electricity and Magnetism-I	2	2	80	20	100
CGL- 102	Core Course-I (Geography)	Physical Geography-I	2	2	80	20	100
CGL- 103	Core Course-II (Geography)	Physical Geography-II	2	2	80	20	100
CCL- 104	Core Course-I (Chemistry)	Inorganic Chemistry-I(Atomic structure and Bonding)	2	2	80	20	100
CCL- 105	Core Course-II (Chemistry)	Organic Chemistry-I(General Organic Chemistry and Aliphatic Hydrocarbons)	2	2	80	20	100
CEL- 104	Core Course-I (Electronics))	Network Analysis and Electronic Devices	2	2	80	20	100
CEL- 105	Core Course-II (Electronics))	Analog Electronics	2	2	80	20	100
CCsL- 104	Core Course-I (Computer Science)	Fundamentals of Computer	2	2	80	20	100
CCsL- 105	Core Course-II (Computer Science)	Programming in 'C'	2	2	80	20	100
CCaL- 104	Core Course- I (Computer Applications)	Computer Fundamentals and Operating System	2	2	80	20	100
CCaL- 105	Core Course- II (Computer Applications)	Office Automation Tools	2	2	80	20	100
CML- 106	Core Course-I (Mathematics)	Algebra	4	4	80	20	100
CML- 107	Core Course-I (Mathematics)	Calculus	4	4	80	20	100
CYL- 111	Awareness Program Compulsory Course	Environmental Studies	2	2	80	20	100
CPP- 108*	Practical-I (Physics)	Physics Lab-I	2	4	50	-	50
CGP- 108*	Practical-I (Geography)	Geography Lab-I	2	4	50	-	50
CCP- 109*	Practical-I (Chemistry)	Chemistry Lab-I	2	4	50	-	50
CEP- 109*	Practical-I (Electronics)	Electronics Lab-I (Network Analysis and Analog	2	4	50	-	50

		Electronics)					
CCsP- 109*	Practical-I (Computer Science)	Computer Lab-I (Based on Fundamentals of Computer & Programming in 'C')	2	4	50	-	50
CCaP- 109*	Practical- I (Computer Applications)	Computer Lab-I	2	4	50	-	50
CMP- 110*	Practical-I (Mathematics)	Mathematics Lab-I	1.5	3	50	-	50

- The practical examination to be conducted annually with Second semester examination.

Semester-II

Paper Code	Course opted	Nomenclature	Credits	Hr/ week	Marks		
					Ext.	Int.	Total
CXL- 201	Language Skills Compulsory Course-II	English-II	2	2	80	20	100
CPL- 202	Core Course-III (Physics)	Mechanics-II	2	2	80	20	100
CPL- 203	Core Course-IV (Physics)	Electricity, Magnetism and EMT-II	2	2	80	20	100
CGL- 202	Core Course-III (Geography)	Human Geography-I	2	2	80	20	100
CGL- 203	Core Course-IV (Geography)	Human Geography-II	2	2	80	20	100
CCL- 204	Core Course-III (Chemistry)	Physical Chemistry- I (Chemical Energetics and Equilibria)	2	2	80	20	100
CCL- 205	Core Course-IV (Chemistry)	Organic Chemistry- II (Functional Group Organic Chemistry)	2	2	80	20	100
CEL- 204	Core Course-III (Electronics)	Linear and Digital Integrated circuits	2	2	80	20	100
CEL- 205	Core Course-IV (Electronics))	Digital Electronics	2	2	80	20	100
CCsL- 204	Core Course-III (Computer Science)	Data Structure using 'C'	2	2	80	20	100
CCsL- 205	Core Course-IV (Computer Science)	Computer Organisation	2	2	80	20	100
CCaL- 204	Core Course- III (Computer Applications)	Information Technology	2	2	80	20	100
CCaL- 205	Core Course- IV (Computer Applications)	Programming in 'C'	2	2	80	20	100
CML- 206	Core Course-III (Mathematics)	Vector Calculus and Geometry	4	4	80	20	100
CML- 207	Core Course-IV (Mathematics)	Ordinary Differential Equations and Laplace Transformations	4	4	80	20	100
CPP- 208	Practical-II	Physics Lab-II	2	4	50	-	50

	(Physics)						
CGP- 208	Practical-II (Geography)	Geography Lab-II	2	4	50	-	50
CPP-209	Practical-II (Chemistry)	Chemistry Lab-II	2	4	50	-	50
CEP-209	Practical-II (Electronics)	Linear Integrated circuits and Digital Electronics Lab	2	4	50	-	50
CCsP-209	Practical-II (Computer Science)	Computer Lab-II (Based on Data Structure using 'C')	2	4	50	-	50
CCaP-209	Practical-II (Computer Applications)	Computer Lab- II	2	4	50	-	50
CMP-210	Practical-II (Mathematics)	Mathematics Lab-II	1.5	3	50	-	50

Note:

(1) The subject combinations under B.Sc. (Physical Sciences)are :

- **(i) B.Sc. (Physical Sciences: Physics, Chemistry, Mathematics)**
- **(ii) B.Sc. (Physical Sciences: Geography, Computer Science, Mathematics)**
- **(iii) B.Sc. (Physical Sciences: Physics, Electronics, Mathematics)**
- **(iv) B.Sc. (Physical Sciences: Physics, Computer Science, Mathematics)**
- **(v) B.Sc. (Physical Sciences: Physics, Computer Applications, Mathematics)**

(2) The scheme and syllabus of Mathematics papers is also implemented to BA (with Mathematics) Courses. However, the marking scheme in case of BA courses (Mathematics Subject) will be same as decided by the concerned Board of Studies/Faculty of Humanities and Social Sciences.

(3) ***For the students of B.Sc. Geography, the core papers of Physics is to be replaced by Core papers of the Geography; for Computer Science, the core papers of Chemistry is to be replaced by Core papers of the Computer Sciences; for Electronics the core papers of Chemistry is to be replaced by Core papers of the Electronics and similarly for Computer Applications, the core papers of Chemistry is to be replaced by Core papers of the Computer Applications as decided by the respective Board of studies/Faculty of Engineering and Technology.***

(4) Definition of Credit:
1 credit=1 Hr. Lecture (L) per week
1 credit= 2 Hrs. Practical (P) per week
2 Hrs. = 3 periods of approx. 40/45 minutes

(5) Practical examinations (both odd and even semester's practicals of 50 marks each) to be held annually with even semesters. The marks of Odd semester practicals may be reflected in the DMC of Even semester with code and nomenclature, to be shown separately for each semester.

(6) The distribution of internal assessment marks of 20 is based on the marks obtained by the student in one Minor test of 12 marks to be conducted preferably in the month of November for Odd Semester and in the month of April for Even Semester. A student is required to pass the individual paper with 35% marks overall including internal assessment based on minor test. He may not be given any additional chance for minor test. However, the student also needs to pass the external examination individually with 35% marks. There will be maximum 4 marks for attendance (1 mark for attendance of 71-75%, 2 marks for attendance of 76-80%, 3 marks for attendance of 81-85% and 4 marks for attendance above 85%.). The remaining 4 marks are for Extracurricular activities including assignments.

(7) The Batches of 20 or more can be opted for various courses as per requirement for all practical purposes by the college/institution. The evaluation of Practical may be distributed as 20% marks for lab record, 50% marks for performance during the examination and 30% marks for Viva Voce examination.

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

LANGUAGE SKILLS COMPULSARY COURSE

(ENGLISH)

CXL-101
LANGUAGE SKILLS COMPULSARY COURSE-I
ENGLISH-I
(Credits: 02, 30 Hrs (2Hrs /week))

External Marks: 80
Internal Assessment: 20
Time Allowed: 3 Hours

Paper setter is required to set five questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of ten short answer type questions each of 2 marks. The remaining four questions is to be set uniformly having two questions from each part/unit of 15 marks each. The student is required to attempt five questions in all.

PART-A: The Following text is prescribed for intensive study:
Following poems from *The Chronicles of Time* edited by Asha Kadyan (Oxford University Press)

1. William Shakespeare "Let Me Not to the Marriage of True Minds"
2. John Donne "Death Be Not Proud"
3. John Milton "On His Blindness"
4. Henry Vaughan "The Retreat"
5. John Dryden "Shadwell"
6. Alexander Pope "Know Then Thyself"
7. William Blake "The Little Black Boy"
8. William Wordsworth "Three Years She Grew in Sun and Shower"
9. Percy B. Shelley "England in 1819"
10. Alfred, Lord Tennyson "Crossing the Bar"

PART-B: English Grammar and Composition

1. Translation from Hindi to English
   (Comprehension based on unseen passage for foreign/non- Hindi speaking candidates)
2. Paragraph Writing
3. Common Phrasal Verbs, Prepositions & Common Errors in English

SCHEME OF QUESTION PAPER

Note: The question paper will carry a maximum of 80 marks. The paper will have five questions as per details given below.

Q. 1. There will be ten short answer type questions (one mark each) based on the text book. (2x10 = 20 marks)

Q.2. (a) The candidates will be asked to explain with reference to the context an extract from the text book. There will be internal choice. (7.5 marks)

(b) The candidates will be asked to answer comprehension questions based on an extract from the text book. There will be internal choice. (7.5 marks)

Q.3. There will be one essay type question based on the text book with internal choice. (15 marks)

Q.4. (a) Translation of a passage of about 10 sentences from Hindi to English (Non-Hindi speaking/foreign candidates will attempt a question of comprehension with internal choice based on an unseen passage in lieu of this question). (7.5 marks)

(b) Paragraph (Candidates will be required to write about 150 words on any one out of the five given topics). (7.5 marks)

Q.5. There will be one question with parts on the following items: common phrasal verbs, prepositions, common errors in English. (15 marks)

CXL-201
LANGUAGE SKILLS COMPULSARY COURSE-II
ENGLISH-II
(Credits: 02, 30 Hrs (2Hrs /week))

External Marks: 80
Internal Assessment: 20
Time Allowed: 3 Hours

Paper setter is required to set five questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of ten short answer type questions each of 2 marks. The remaining four questions is to be set uniformly having two questions from each part/unit of 15 marks each. The student is required to attempt five questions in all.

PART-A: The following text is prescribed for intensive study:
1. Following essays from *Ideas Aglow* edited by Dinesh Kumar and V. B. Abrol (Publication Bureau, Kurukshetra University, Kurukshetra)

1. C.E.M. Joad 'Our Civilization'
2. Jayant V. Narlikar 'It's Question Time'
3. N. Ram 'An Interview with Christiaan Barnard'
4. B.R. Ambedkar 'Untouchability and the Caste System'
5. Huck Gutman 'Inhumanisation of War'
6. Amartya Sen 'Seven Types of Gender Inequality'

PART-B: English Grammar and Composition

1. Translation from English to Hindi
(Comprehension based on unseen passage for foreign/non- Hindi speaking candidates)
2. Précis
3. Official Correspondence: Letter Writing

SCHEME OF QUESTION PAPER

Note: The question paper will carry a maximum of 80 marks. The paper will have five questions as per details given below.

Q. 1. There will be ten short answer type questions (one mark each) based on the text book. (2x10 = 10 marks)

Q.2. (a) The candidates will be asked to explain with reference to the context an extract from the text book. There will be internal choice. (7.5 marks)

(b) The candidates will be asked to answer comprehension questions based on an extract from the text book. There will be internal choice. (7.5 marks)

There will be one essay type question based on the text book with internal choice. (15 marks)

Q.4. (a) Translation of a passage of about 10 sentences from English to Hindi (Non-Hindi speaking/foreign candidates will attempt a question of comprehension with internal choice based on an unseen passage in lieu of this question). (7.5 marks)

(b) Précis: The candidates will be required to summarize a given passage in Contemporary English of about 250 words to one-third of its length and also give it a suitable heading. (7.5 marks)

The candidates will be asked to write an official letter. There will be internal choice. (15 marks)

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

(PHYSICS)

CPL-102
Core Course-I
MECHANICS-I
(Credits – 02, 30 Hrs (2 Hrs/week))

Marks for Major test (External): 80
Marks for internal Exam : 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory, The paper will include at least 20% of total marks as numerical problems.

Course Objective	Course Outcome
The course on mechanics deals with some important mathematical physics concepts, Laws of Motion,Rotational motion, Gravitation, and Elasticity.	The student will be able to understand basic mathematical physics equations, motion of different objects, global positioning system, planetary motion etc.

UNIT-I

Vectors: Scalar and vector fields, Derivatives of a vector with respect to a parameter, Gradient of a scalar field and its geometrical interpretation, Divergence and curl of a vector field, Laplacian operator, Vector identities,Line, surface and volume integrals of Vector fields, Flux of a vector field, Gauss's divergence theorem, Stokes Theorem and their applications (no rigorous proofs) (Any mathematical physics book)

UNIT-II

Time derivative of vectors with examples (*1.10, Ref. 1*), Concepts of cartesian, polar and spherical coordinates, Motion in plane Polar Coordinates, velocity and acceleration in polar coordinates (*1.11, Ref. 1*), Dynamics Using Polar Coordinates (*2.10, Ref. 1*)

Momentum and Energy: Momentum, Conservation of momentum, Centre of mass, Centre of mass coordinates with examples (*4.1 to 4.5Ref. 1*), Motion of rockets (*4.8, Ref. 1*), Work and energy, Conservation of energy (*5.1 to 5.3, Ref. 1*)

UNIT-III

Dynamics of a system of particles: Elastic and inelastic collisions between particles (*6.5.2, Ref. 1*), Centre of Mass and Laboratory frames (*6.5.4, Ref. 1*)

Rotational Motion: Angular velocity and angular momentum (*7.2, Ref. 1*), Moment of inertia and parallel and perpendicular axis theorem (*7.3, Ref. 1*), Moment of inertia of (a) thin uniform wire (b) Thin rectangular sheet (c) Rectangular slab (d) ring (e) disc (f) spherical shell (g) solid sphere (h) hollow sphere, Torque (*7.4, Ref. 1*), Conservation of angular momentum (*7.5, Ref. 1*), Angular momentum as vector (*8.2, Ref. 1*), Coriolis forces and its effect on motion (*9.5 along with examples, Ref. 1*)

UNIT-IV

Central force: Basics properties of central forces, Two body problem equivalent to one body problem and concept of reduced mass, Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant) (*10.2, 10.3 Ref. 1*), Kepler's Laws (*10.1 along with example 7.6 of Ref. 1)*

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli, Poisson's Ratio, Relation between four elastic constants (*Ref. 4*), Bending moments, Bending of cantilever and centrally loaded beams (*Ref. 4*)

Reference Books:

1. An introduction to Mechanics (2^{nd} Ed.), D. Kleppner and R.J. Kolenkow, Cambridge Univ. Press
2. University Physics, FW Sears, MW Zemansky and HD Young13/e, 1986. Addison-Wesley
3. Mechanics Berkeley Physics course,v.1: Charles Kittel, et. Al. 2007, Tata McGraw-Hill.
4. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000.
5. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
6. Classical Mechanics, J.C Uppadhayaya, Himalaya Publishing House

CPL-103

Core Course –II

ELECTRICITY AND MAGNETISM-I

(Credits – 02, 30 Hrs (2 Hrs/week))

Marks for Major test (External): 80
Marks for internal Exam : 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit.The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory. The paper will include at least 20% of total marks as numerical problems.

Course Objective	Course Outcome
The course on Electricity and Magnetism deals with Coulomb's law, Electric field, potential formulation of electrostatic, Capacitors, Magnetism and magnetic materials along with the applications of these concepts	The student will be able to understand Gauss-divergence theorem, Stokes theorem in dielectrics, electrical and magnetic properties of materials

UNIT-I

Electrostatics: Electrostatic Field (*2.1, Ref.1*), Electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem (*2.2, Ref.1*), Divergence and curl of electrostatic field (*2.2, Ref.1*) and their physical significance, Electric potential, Electric potential as line integral of electric field (*2.3, Ref.1*), Calculation of electric field from potential, Energy stored in electrostatic field per unit volume (*2.4 of ref.1*)

UNIT-II

Application of Electrostatics: Laplace and Poisson's equations for the electrostatic field (*2.3.3, 3.1: Ref.1*), Multi-pole expansion of potential due to arbitrary charge distribution (*3.4:Ref.1*), Dielectric medium, Polarization (*4.1:Ref.1*), Bound charges in a polarized dielectric and their physical interpretation (*4.2:Ref.1*), Electric displacement (*4.3.1:Ref.1*), Gauss's theorem in dielectrics (*4.3.1:Ref.1*), Parallel plate capacitor completely filled with dielectric, Susceptibility, Permittivity and dielectric constants (*4.4.1:Ref.1*)

UNIT-III

Magnetism: Lorentz force law, Magnetic forces (*5.1:Ref.1*), Magnetostatics: Biot-Savart's law & its applications (1) straight conductor (2) circular coil (3) solenoid carrying current (*5.2:Ref.1*), Divergence and curl of magnetic field (*5.3.1:Ref.1*), Ampere's circuital law and it's applications for simple current configurations (*5.3.3:Ref.1*), Magnetic vector potential (*5.4.1:Ref.1*).

UNIT-IV

Magnetization: The field of a magnetized object, bound currents, physical interpretation of bound currents (*6.2:Ref.1*), Ampere's law for magnetized objects, The Auxiliary field (H) (*6.3:Ref.1*), Magnetic properties of materials (*6.1:Ref.1*), Permeability, Magnetic susceptibility (*6.4:Ref.1*), diamagnetism, para-magnetism and ferromagnetism(*6.1, 6.4.2:Ref.1*), B-H Curve (*6.4.2:Ref.1*), Currie point (*6.4.2:Ref.1*)

Reference Books:

1. Introduction to Electrodynamics, 3rd Ed., 1998, D.J. Griffiths, Benjamin Cummings.
2. ElectricityandMagnetism,EdwardM.Purcell,1986,McGraw-HillEducation.
3. Electricity and Magnetism, J.H. Fewkes& J. Yarwood. Vol. I, 1991, Oxford Univ. Press.
4. University Physics, Ronald Lane Reese, 2003, ThomsonBrooks/Cole.

CPP- 108
Practical -I; Physics Lab--I
(Credits: 02, 60 Hours (4hrs. per week))

Max. Marks: 50

Time: 4 Hours

Note:-

1. *Do any four experiments from each Section.*
2. *The students are required to calculate the error involved in a particular experiment.*
3. *For giving marks under Lab. Record each college will maintain practical assessment record by using the following procedure:-*
   Each student has to perform a minimum number of experiments prescribed in the syllabus.
   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 constitute the lab. Record.
4. *To compute the final marks for lab. Record, a separate register will be maintained. Each student will be assigned separate page on this register. On this page the marks obtained by the student in different practicals will be entered. This record will be signed by the concerned teacher.*
5. *The laboratory Record register will be presented to eth external practical examiners fro Lab.Record marks. These external examiners may verify the record randomly.*

Section: A

1. Moment of Inertia of a fly-wheel.
2. M.I. of an irregular body using a torsion pendulum.
3. Surface tension by Jeager's Method.
4. Young's Modulus by bending of beam.
5. Modulus of rigidity by Maxell's needle.

Section: B

6. E.C.E of Hydrogen using an Votameter
7. Determination of Impedance of an A.C. circuit and its verification.
8. Frequency of A.C. mains by Sonometer using an electromagnet.
9. Frequency of A. C. mains by Sonometer using an electric vibrator.
10. Low resistance by Carey Foster's bridge with calibration.

References:

1 Worshnop and Flint, Advanced Practical Physics

2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Bookd Ltd, New Delhi

3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ran & Sons, Delhi 4 Gupta S L and Kumar V, Practical Physics, Pragati Prakashan, Meerut.

CPL-202
Core Course-III
MECHANICS-II
(Credits – 02, 30 Hrs (2 Hrs/week))

Marks for Major test (External): 80
Marks for internal Exam : 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory, *The paper will include at least 20% of total marks as numerical problems.*

Course Objective	Course Outcome
The course on mechanics deals with Lagrengian formulation of mechanics, Oscillatory motion and damping and special theory relativity	The student will be able to understand some advanced notion of mechanics, SHM and relativistic addition of velocities.

UNIT-I

Constrained motion, Degree of freedom and Generalized coordinates, Generalized displacement,velocity, acceleration, momentum, force and potential, Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Application of Lagrange's equation for simple problems of mechanics (*Ref.1*).

UNIT-II

Oscillations: Simple harmonic motion, Simple pendulum (*11.2, Ref.2*), Compound Pendulum, Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations (11.3, *11.2, Ref.2*), Forced oscillations (11.2, *11.4, Ref.2*).

UNIT-III

Theory of Relativity: Inertial and non-inertial frame of references, Galilean transformation (velocity, acceleration) and its inadequacy (sec. 1.2 and 1.3 of Resnick), Michelson-Morley Experiment and its outcome (sec. 1.5 of Resnick), Postulates of Special Theory of Relativity (sec. 1.9 of Resnick), Lorentz Transformations (sec. 2.2 of Resnick), Length contraction, Time dilation (sec.2.3 of Resnick).

UNIT-IV

Application of Relativity: Relativistic transformation of velocity (*2.6, Ref.3*), frequency and wave number (*2.7, Ref.3*), Variation of mass with velocity (*3.2, 3.3 Ref.3),* Massless Particles, Mass-energy Equivalence (*3.6, Ref.3*), Relativistic Doppler effect (*2.7, Ref.3*), Relativistic Kinematics(*3.5, Ref.3*), Transformation of Energy and Momentum (*3.7, Ref.3*), Four Vectors (*3.7, Ref.3*)

Reference Books:

1. Classical Mechanics, 3rd Edition, Pearson
2. An introduction to Mechanics, D. Kleppner and R.J. Kolenkow, 1973, McGraw-Hill.
3. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
4. Mechanics Berkeley Physics course,v.1: Charles Kittel, et. Al. 2007, Tata McGraw-Hill.
5. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
6. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000.

CPL-203

Core Course-IV

ELECTRICITY, MAGNETISM & ELECTROMAGNETIC THEORY-II

((Credits – 02, 30 Hrs (2 Hrs/week))

Marks for Major test (External): 80

Marks for internal Exam : 20

Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit.The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory, The paper will include at least 20% of total marks as numerical problems.

Course Objective	Course Outcome
The course on Electricity and Magnetism deals with the Electromagnetic induction, Maxwell's Equations, Electromagnetic wave propagation, Poynting's Vector and electromagnetic field transformation	The student will be able to understand electromagnetic induction and it's applications, Maxwell's equations and generation of electromagnetic fields, wave propagation through vacuum and isotropicdielectricmedium.

UNIT-I

Electromagnetic Induction: Motional EMF (*7.1.2, 7.1.3:Ref.1*), Faraday's laws of electromagnetic induction (*7.2:Ref.1*), Self and mutual inductance (L and M respectively) (*7.2.3:Ref.1*, Energy stored in magnetic field (*7.2.4:Ref.1*).

AC Circuit Analysis: AC circuit analysis using complex variables, AC circuits with (a) R and C (b) R and L (c) R, L and C, Series and parallel resonance circuits, Quality factors and its importance

UNIT-II

Maxwell`sequations: Maxwell's fixing of Ampere's law, Displacement current, Maxwell's equations in vacuum, Maxwell's equations in matter (*7.3:Ref.1*), The continuity equation (*8.1.1:Ref.1*), Poynting Theorem and Poynting vector (*8.1.2:Ref.1*), Momentum and angular momentum in electromagnetic field (qualitative only) (*8.2.3,8.2.4:Ref.1*), Energy density in electromagnetic field (*8.1.2:Ref.1*).

UNIT-III

The wave equation, Sinusoidal waves (*9.1.1, 9.1.2, 9.1.4:Ref.1*), Wave equations for **E** and **B** fields, Electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, Energy and momentum in EM waves (9.2*:Ref.1*), Propagation in linear media (*9.3.1:Ref.1*), Reflection and transmission at Normal and Oblique incidence (*9.3.2,9.3.3:Ref.1*), Brewster's angle (*9.3.3:Ref.1*)

UNIT-IV

Scalar and vector potential for electromagnetic fields (*10.1.1:Ref.1*), Gauge Transformation (*10.1.2:Ref.1*), Coulomb Gauge, Lorentz Gauge (*10.1.3:Ref.1*), Electric and magnetic dipole radiation (no derivation needed, discussion of results only) (*11.1.1 and results and assumptions used to derive the results in section 11.1.2, 11.1.3:Ref.1*), Magnetism as relativistic phenomenon (*12.3.1:Ref.1or:Ref.2)*, Transformation of electric and magnetic fields between two inertial frames (*12.3.2:Ref.1or :Ref.2*).

Reference Books:

1. Introduction to Electrodynamics, 3rd Ed., 1998, D.J. Griffiths, Benjamin Cummings.
2. ElectricityandMagnetism,EdwardM.Purcell,1986,McGraw-HillEducation..
3. Electricity and Magnetism, J.H. Fewkes& J. Yarwood. Vol. I, 1991, Oxford Univ. Press.
4. University Physics, Ronald Lane Reese, 2003, ThomsonBrooks/Cole.

CPP 208
Practical -II; Physics Lab--II
(Credits: 02; 60 Hrs (4Hrs /week))

Marks: 50

Time: 3 Hours

Note:-

1. *Do any Four experiments from each Section.*
2. *The students are required to calculate the error involved in a particular experiment.*

3. *For giving marks under Lab. Record each college will maintain practical assessment record by using the following procedure:-*
   Each student has to perform a minimum number of experiments prescribed in the syllabus.

   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 constitute the lab. Record. To compute the final marks for lab. Record, a separate register will be maintained. Each student will be assigned separate page on this register. On this page the marks obtained by the student in different practicals will be entered. This record will be signed by the concerned teacher.

4. *The laboratory Record register will be presented to eth external practical examiners fro Lab.Record marks. These external examiners may verify the record randomly.*

Section: A

1. Elastic constant by Scarle's method.
2. Viscosity of water by its flow through a uniform capillary tube.
3. 'g' by Bar pendulum..
4. Calibration of a thermocouple by Potentiometer.

Section: B

5. High resistance by substitution method.
6. To draw forward and reverse bias characteristics of a semiconductor diode.
7. Zener Diode voltage regulation characteristics.
8. Verification of inverse square law by photo-cell.
9. To study the characteristics of a solar cell.

References:

1 Worshnop and Flint, Advanced Practical Physics

2 Nelkon M and Ogborn, Advanced Level Practical Physics, Heinemann Education Bookd Ltd, New Delhi

3 Srivastava S S and Gupta M K, Experiments in Electronics, Atma Ran & Sons, Delhi 4 Gupta S L and Kumar V, Practical Physics, Pragati Prakashan, Meerut.

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

(GEOGRAPHY)

CGL- 102
Core Course-I
PHYSICAL GEOGRAPHY-I
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

Unit-I

Physical Geography: Definition, Nature & Scope.
Origin of the Earth: Tidal and Big Bang Theory

Unit-II

Internal Structure of Earth
(Based on Seismic Evidences)
The Rocks: Classification of Rocks and associated features

Unit-III

Endogenetic and Exogenetic processes
Plate Tectonics: Meaning & Types of Plates, Motion & Associated features

Unit-IV

Agents of Denudation: Wind, River and underground water
Cycle of Erosion: Davis and Penck

CGL- 103

Core Course-II

PHYSICAL GEOGRAPHY-II

(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

Unit-I

Atmosphere: Composition and Structure
Insolation and Temperature
Global Air Circulation Pattern: Permanent, Periodic and Local winds

Unit-II

Monsoon and Theories of it's origin
Fronts and Cyclones (Temperate and Tropical)

Unit-III

Hydrological Cycle
Ocean Floor Relief Features

Unit-Iv

Ocean Water temperature and Salinity
Ocean water Circulation: Tides and Currents

Reading List

1. Conserva H. T., 2004: Illustrated Dictionary of Physical Geography, Author House, USA.
2. Gabler R. E., Petersen J. F. and Trapasso, L. M., 2007: Essentials of Physical Geography (8th Edition), Thompson, Brooks/Cole, USA.
3. Garrett N., 2000: Advanced Geography, Oxford University Press.
4. Goudie, A., 1984: The Nature of the Environment: An Advanced Physical Geography, Basil Blackwell Publishers, Oxford.
5. Hamblin, W. K., 1995: Earth's Dynamic System, Prentice Hall, N.J.
6. Husain M., 2002: Fundamentals of Physical Geography, Rawat Publications, Jaipur.
7. Monkhouse, F. J. 2009: Principles of Physical Geography, Platinum Publishers, Kolkata.
8. Strahler A. N. and Strahler A. H., 2008: Modern Physical Geography, John Wiley & Sons, New York.

CGP- 108

Practical -I; Geography Lab--I

(Credits: 02, 60 Hours (4hrs. per week))

Max. Marks: 50

Time: 4 Hours

Note:-Distribution of Marks is as under:
Exercise – 60

Record File- 20
Viva-voce-20

1. For giving marks under Lab. Record each college will maintain practical assessment record by using the following procedure:-

Each student has to perform a minimum number of exercises/experiments prescribed in the syllabus. After the completion of a practical the teacher concerned will check the note book and

– 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 constitute the lab. Record.

2. To compute the final marks for lab. Record, a separate register will be maintained. Each student will be assigned separate page on this register. On this page the marks obtained by the student in different practical's will be entered. This record will be signed by the concerned teacher.

3. The laboratory Record register will be presented to the external practical examiners for Lab.Record marks. These external examiners may verify the record randomly.

Exercises:

1.	Methods of representing relief.	1
2.	Representation of Topographical features by contours. Slopes (Concave, convex and undulating) Valleys (V Shaped, U shaped and Gorge) Ridges (Volcanic hill, Plateau and Escarpment)	3
3.	Drawing of Profiles (a) Cross Profiles: Serial, superimposed, projected and composite profiles. (b) Longitudinal profiles	5
4.	Interpretation of Topographical and weather maps	2
5.	Chain & Tape Survey	2

Suggested Readings:

1. F.J. Monkhouse and H.R. Wilkinson (1972) Maps and Diagrams, Mothuen and Co. Ltd.,London.
2. L.R. Singh and Raghuvander Singh (1973), Map Work and Practical Geography, Central Book Depot, Allahabad.
3. R.I. Singh and P.K. Dutt (1968), Elements of Practical Geography, Students Friends, Allahabad
4. Singh Gopal (2004) 4th edition, Map Work and Practical Geography, Vikas Publication House, New Delhi.

CGL- 202
Core Course-III
HUMAN GEOGRAPHY-I
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

Unit-I

Definition, Nature & Scope of Human Geography
Major Branches of Human Geography

Unit-II

Concepts of Human Geography- Environmental Determinism, Possibilism, Neo-Determinism
Contemporary Relevance of Human Geography

Unit-III

Evolution of Man : Classification and Characteristics of Human races, Griffith Taylor's Classification
Human Adaption to Environment – Gujjars-Bakarwals and Bushman

Unit-IV

Cultural Regions of the World
Major Religion & Languages of the World and their Distribution

CGL- 203
Core Course-IV
HUMAN GEOGRAPHY-II
Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

Unit-I

World Population Distribution
World Population Composition (Age, Sex and Literacy)

Unit-II

World Population Density and Growth
Demographic Transition Theory

Unit-III

Classification of rural and urban settlements
Trends and Patterns of World Urbanisation

Unit-IV

Theories of Morphological Structure of Urban Centres, Burgess, Homer Hyot, Harris-Ullman.

Reading List

1. Chandna, R.C. (2010) Population Geography, Kalyani Publisher.
2. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.
3. Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.
4. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.
5. Kaushik, S.D. (2010) Manav Bhugol, Rastogi Publication, Meerut.
6. Maurya, S.D. (2012) Manav Bhugol, Sharda Pustak Bhawan. Allahabad.
7. Ghosh, S. (2015) Introduction to settlement geography. Orient Black Swan Private Ltd., Kolkata
8. Hussain, Majid (2012) Manav Bhugol. Rawat Publications, Jaipur

CGP- 208

Practical -II; Geography Lab--II

(Credits: 02, 60 Hours (4hrs. per week))

Max. Marks: 50

Time: 4 Hours

Note:-Distribution of Marks is as under:

Exercise – 60

Record File- 20

Viva-voce-20

1. *For giving marks under Lab. Record each college will maintain practical assessment record by using the following procedure:-*
   Each student has to perform a minimum number of exercises/experiments prescribed in the syllabus.

   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 constitute the lab. Record.

2. *To compute the final marks for lab. Record, a separate register will be maintained. Each student will be assigned separate page on this register. On this page the marks obtained by the student in different practical's will be entered. This record will be signed by the concerned teacher.*
3. *The laboratory Record register will be presented to the external practical examiners for Lab.Record marks. These external examiners may verify the record randomly.*

1.	Map Scales.	Exercises
i)	Method of Expressing a Scale	4
ii)	Conversion of Statement of Scale into R.F. and Vice-versa.	
iii)	Plain Scale (Km and mile)	
iv)	Comparative Scale	
v)	Diagonal Scale	
2.	Measurement of Distances and Areas on Maps	1
3.	Enlargement and Reduction of Maps	2
4.	Qualitative Map : Choroschematic and Chorocromatic	2
	Quantitative Map: Dot Method and Choropleth	2
5.	Plain Table Survey	2

1. F.J. Monkhouse and H.R. Wilkinson (1972) Maps and Diagrams, Mothuen and Co. Ltd., London
2. L.R. Singh and Raghuvander Singh (1973), Map Work and Practical Geography, Central Book Depot, Allahabad.
3. R.I. Singh and P.K. Dutt (1968), Elements of Practical Geography, Students Friends, Allahabad.
4. Singh Gopal (2004) 4th edition, Map Work and Practical Geography, Viksa Publication House.

SEMESTER I&II

B. SC. PHYSICAL SCIENCES

(CHEMISTRY)

CCL- 104
Core Course-I
INORGANIC CHEMISTRY--I
(ATOMIC STRUCTURE AND BONDING)
(Credits: 02;30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I

Atomic Structure-I **(8 Hours)**

Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.

What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wavefunctions (atomic orbitals) and their variations for 1*s*, 2*s*, 2*p*, 3*s*, 3*p* and 3*d* orbitals (Only graphical representation).

UNIT-II

Atomic Structure-II **(7 Hours)**

Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1*s* and 2*s* atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s. Shapes of *s*, *p* and *d* atomic orbitals, nodal planes. Discovery of spin, spin quantum number (*s*) and magnetic spin quantum number (m_s).

Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

UNIT-III

Chemical Bonding **(8 Hours)**

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

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

Concept of resonance and resonating structures in various inorganic and organic compounds.

UNIT-IV

Molecular Structure **(7 Hours)**

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of *s-p* mixing) and heteronuclear diatomic molecules such as CO, NO and NO^+. Comparison of VB and MO approaches.

Reference Books:

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. & Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. *Inorganic Chemistry: Principles of Structure and Reactivity*, Pearson Education India, 2006.

CCL- 105
Core Course-II
ORGANIC CHEMISTRY--I
(GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS)
(Credits: 02, 30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I

Fundamentals of Organic Chemistry **(7 Hours)**

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.

UNIT-II

Stereochemistry **(8 Hours)**

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

UNIT-III

Aliphatic Hydrocarbons-I **(8 Hours)**

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes: (Upto 5 Carbons). *Preparation:* Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Upto 5 Carbons) *Preparation:* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). *Reactions:* cis-

addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation.

UNIT-IV

Aliphatic Hydrocarbons-II **(7 Hours)**

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkynes: (Upto 5 Carbons) *Preparation:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alk. $KMnO_4$.

Reference Books:

- Graham Solomon, T.W., Fryhle, C.B. & Dnyder, S.A. *Organic Chemistry,* John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry,* Orient Longman, New Delhi (1988).
- Eliel, E.L. *Stereochemistry of Carbon Compounds*, Tata McGraw Hill education, 2000.
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. & Bahl, B.S. *Advanced Organic Chemistry,* S. Chand, 2010.

CCP- 109

Practical -I; Chemistry Lab--I

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

(Credits: 02, 60 Hours (4hrs. per week))

Marks: 50

Time: 4 Hours

Section A: Inorganic Chemistry - Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.

2. Estimation of oxalic acid by titrating it with $KMnO_4$.

3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.

4. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.

5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)

2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given)

(a) Identify and separate the components of a given mixture of two amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography

(b) Identify and separate the sugars present in the given mixture by paper chromatography.

Reference Books:

- Svehla, G. *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
- Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.
- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.

CCL 204
Core Course-III
PHYSICAL CHEMISTRY--I
(CHEMICAL ENERGETICS AND EQUILIBRIA)
(Credits: 02; 30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I

Chemical Energetics **(8 Hours)**

Review of thermodynamics and the Laws of Thermodynamics.

Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.

UNIT-II

Chemical Equilibrium **(8 Hours)**

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between G and G^{o}, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases.

UNIT-III

Ionic Equilibria-I **(7 Hours)**

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect.

UNIT-IV

Ionic Equilibria-II **(7 Hours)**

Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Reference Books:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry* Cengage Learning India Pvt. Ltd., New Delhi (2009).
- Mahan, B.H. *University Chemistry* 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry* 5th Ed. Macmillan Publishing Co.: New York (1985).

CCL 205

Core Course-IV
ORGANIC CHEMISTRY--II
(FUNCTIONAL GROUP ORGANIC CHEMISTRY)
(Credits: 02; 30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure for all UNITS I-IV.

Aromatic hydrocarbons **(7 Hours)**

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.

Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

UNIT-II

Alkyl and Aryl Halides **(8 Hours)**

Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (S_N1, S_N2 and S_Ni) reactions.

Preparation: from alkenes *and* alcohols.

Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.

Aryl Halides *Preparation:* (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions.

Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$).

Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

UNIT-III

Alcohols, Phenols and Ethers (Upto 5 Carbons) **(8 Hours)**

Alcohols: *Preparation:* Preparation of 1^{o}, 2^{o} and 3^{o} alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation *Diols:* (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) *Preparation:* Cumene hydroperoxide method, from diazonium salts. *Reactions:* Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction.

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

UNIT-IV

Aldehydes and ketones (aliphatic and aromatic) (7 Hours)

(Formaldehye, acetaldehyde, acetone and benzaldehyde)

Preparation: from acid chlorides and from nitriles.

Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.

Reference Books:

- Graham Solomon, T.W., Fryhle, C.B. & Dnyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7^{th} Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry,* Orient Longman, New Delhi (1988).
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. & Bahl, B.S. *Advanced Organic Chemistry,* S. Chand, 2010.

CCP 209

Practical -II

Chemistry Lab--II

CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

(Credits: 02; 60 Hrs (4Hrs /week)

Marks: 50

Time: 4 Hours

Section A: Physical Chemistry

Thermochemistry

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO_3, NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of *H*. **Ionic equilibria** pH measurements

a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.

b) Preparation of buffer solutions:

(i) Sodium acetate-acetic acid

(ii) Ammonium chloride-ammonium hydroxide

Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water and alcohol) and distillation.
2. Criteria of Purity: Determination of melting and boiling points.
3. Preparations: Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done.

(a) Bromination of Phenol/Aniline

(b) Benzoylation of amines/phenols

(c) Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone

Reference Books

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
- Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

(ELECTRONICS)

CEL- 104
Core Course-I
NETWORK ANALYSIS AND ELECTRONIC DEVICES
(Credits: 02;30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I **(8 Hours)**

Circuit Analysis:

Concept of Voltage and Current Sources. Kirchhoff's Current Law, Kirchhoff's Voltage Law. Mesh Analysis. Node Analysis.

UNIT-II **(8 Hours)**

Networks:

Star and Delta networks, Star-Delta Conversion. Principal of Duality. Superposition Theorem. Thevenin Theorem. Norton's Theorem.

UNIT-III **(8 Hours)**

Networks:

Reciprocity Theorem. Maximum Power Transfer Theorem. Two Port Networks: h, y and z parameters and their conversion.

UNIT-IV **(6 Hours)**

Unipolar Devices:

JFET. Construction, working and I-V characteristics (output and transfer), Pinchoff voltage. UJT, basic construction, working, equivalent circuit and I-V characteristics.

Reference Books:

- Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)
- Electrical Circuits, M. Nahvi & J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
- Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
- Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.
- Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning
- Network Analysis, G.K. Mithal, Khanna Publication
- Basic Electronics and Linear Circuits, N.N Bhargava, D C Kulshreshtha
- Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
- Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn.,Oxford University Press.
- J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
- J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)

CEL- 105
Core Course-II
ANALOG ELECTRONICS
(Credits: 02, 30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I (8 Hours)

Junction Diode:

PN junction diode (Ideal and practical)-constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics.Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Qualitative idea of Schottky diode.

Junction Diode Applications:

Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation- Line and load regulation, Zener diode as voltage regulator, and explanation for load and line regulation.

UNIT-II (8 Hours)

Bipolar Junction Transistor:

Review of the characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β. dc load line and Q point. Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S.

UNIT-III (7 Hours)

Amplifiers:

Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and C Amplifiers.

Cascaded Amplifiers:

Two stage RC Coupled Amplifier and its Frequency Response.

UNIT-IV (7 Hours)

Feedback in Amplifiers:

Concept of feedback, negative and positive feedback, advantages of negative feedback

Sinusoidal Oscillators:

Barkhausen criterion for sustained oscillations. Phase shift and Colpitt's oscillator. Determination of Frequency and Condition of oscillation.

Reference Books:

- Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
- Basic Electronics and Linear Circuits, N.N Bhargava, D C Kulshreshtha
- Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn.,Oxford University Press.
- J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
- J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)

CEP- 109
Practical -I; NETWORK ANALYSIS AND ANALOG ELECTRONICS LAB (Credits: 02, 60 Hours (4hrs. per week))

Marks: 50

Time: 4 Hours

AT LEAST 12 EXPERIMENTS FROM THE FOLLOWING BESIDES #1

6. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
7. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
8. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
9. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
10. Verification of the Maximum Power Transfer Theorem.
11. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
12. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
13. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.
14. Study of the I-V Characteristics of UJT and design relaxation oscillator..
15. Study of the output and transfer I-V characteristics of common source JFET.
16. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.
17. Design of a Single Stage CE amplifier of given gain.
18. Study of the RC Phase Shift Oscillator.
19. Study the Colpitt`s oscillator.

Reference Books:

- Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.
- J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
- Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
- Allen Mottershead, Electronic Devices & Circuits, Goodyear Publishing Corp oration.

CEL 204
Core Course-III
LINEAR AND DIGITAL INTEGRATED CIRCUITS
(Credits: 02; 30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all . Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I

Operational Amplifiers (Black box approach): **(8 Hours)**

Power supplies for ICs, Interpretation of data sheets, Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Ideal voltage transfer curve, Open and closed loop configuration, Frequency Response. CMRR. Slew Rate and concept of Virtual Ground.

UNIT-II

Applications of Op-Amps: **(8 Hours)**

(1) Inverting and non-inverting amplifiers, (2) Summing and Difference Amplifier (3) Differentiator, (4) Integrator (5) Voltage to current converter

UNIT-III

Applications of Op-Amps: **(8 Hours)**

(6) Active low pass and high pass Butterworth filter (1st and 2nd order) (7) Wein bridge oscillator (8) Square wave generator(9) Comparator and Zero-crossing detector (10) clippers and clampers

UNIT-IV

D-A and A-D Conversion: **(6 Hours)**

4 bit binary weighted and R-2R D-A converters, circuit and working. Accuracy and Resolution. A-D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all).

Reference Books:

- OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall
- Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.
- Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011,Tata McGraw
- Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.

CEL 205
Core Course-IV
DIGITAL ELECTRONICS
(Credits: 02; 30 Hrs (2Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT-I **(8 Hours)**

Number System and Codes:

Decimal, Binary, Octal and Hexadecimal number systems, base conversions.

Representation of signed and unsigned numbers, BCD code. Binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, multiplication. **Logic Gates and Boolean algebra**:

Truth Tables of OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra.

UNIT-II **(8 Hours)**

Combinational Logic Analysis and Design:

Standard representation of logic functions(SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP). **Arithmetic Circuits**:

Binary Addition. Half and Full Adder. Half and Full Subtractor, 4-bit binary Adder/ Subtractor.

Data processing circuits:

Multiplexers, De-multiplexers, Decoders, Encoders.

.

UNIT-III (8 Hours)

Clock and Timer (IC 555):

Introduction, Block diagram of IC 555, Astable and Monostable multivibrator circuits

Sequential Circuits:

SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop.

UNIT-IV (6 Hours)

Shift registers:

Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

Counters (4 bits):

Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter.

Reference Books:

- Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011,Tata McGraw
- Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning.
- Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
- R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw-Hill (1994)

CEP 209

Practical -II; LINEAR INTEGRATED CIRCUITS AND DIGITAL ELECTRONICS LAB

(Credits: 02; 60 Hrs (4Hrs /week)

Marks: 50

Time: 4 Hours

At least 04 experiments each from section A, B and C

Section-A: Op-Amp. Circuits (Hardware)

1. To design an inverting amplifier using Op-amp (741,351)for dc voltage of given gain
2. (a) To design inverting amplifier using Op-amp (741,351) & study its frequency response

   (b) To design non-inverting amplifier using Op-amp (741,351) & study frequency response
3. (a) To add two dc voltages using Op-amp in inverting and non-inverting mode

   (b) To study the zero-crossing detector and comparator.
4. To design a precision Differential amplifier of given I/O specification using Op-amp.
5. To investigate the use of an op-amp as an Integrator.
6. To investigate the use of an op-amp as a Differentiator.
7. To design a Wien bridge oscillator for given frequency using an op-amp.
8. To design a circuit to simulate the solution of simultaneous equation and 1st/2ndorder differential equation.
9. Design a Butterworth Low Pass active Filter (1st order) & study Frequency Response
10. Design a Butterworth High Pass active Filter (1st order) & study Frequency Response
11. Design a digital to analog converter (DAC) of given specifications.

Section-B: Digital circuits (Hardware)

1. (a) To design a combinational logic system for a specified Truth Table.

   (b) To convert Boolean expression into logic circuit & design it using logic gate ICs.

   (c) To minimize a given logic circuit.

2. Half Adder and Full Adder.

3. Half Subtractor and Full Subtractor.

4. 4 bit binary adder and adder-subtractor using Full adder IC.

5. To design a seven segment decoder.

6. To design an Astable Multivibrator of given specification using IC 555 Timer.

7. To design a Monostable Multivibrator of given specification using IC 555 Timer.

8. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.

9. To build JK Master-slave flip-flop using Flip-Flop ICs

10. To build a Counter using D-type/JK Flip-Flop ICs and study timing diagram.

11. To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs.

Section-C: SPICE/MULTISIM simulations for electronic circuits and devices

1. To verify the Thevenin and Norton Theorems.
2. Design and analyze the series and parallel LCR circuits
3. Design the inverting and non-inverting amplifier using an Op-Amp of given gain
4. Design and Verification of op-amp as integrator and differentiator
5. Design the 1storder active low pass and high pass filters of given cutoff frequency
6. Design a Wein`s Bridge oscillator of given frequency.
7. Design clocked SR and JK Flip-Flop`s using NAND Gates
8. Design 4-bit asynchronous counter using Flip-Flop ICs
9. Design the CE amplifier of a given gain and its frequency response.

Reference Books :

- Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011,Tata McGraw
- OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edn., 2000, Prentice Hall
- R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw-Hill (1994)
- Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

(COMPUTER SCIENCE)

CCsL- 104
Core Course-I
COMPUTER FUNDAMENTALS
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT I

Computer Fundamentals:

Introduction to Computers: Characteristics and Limitations of Computers, Evolution of Computers, Classification of Computers. Computer Languages. Computer Programs, Structured Programming Concepts

Basic Computer Organization:

Units of a computer, CPU, ALU, Memory Hierarchy, Registers, I/O devices. Mother

Board, **UNIT II**

Word Processing:

Introduction to MS-Word, Creating & Editing: Formatting Document, Page, Table; Bookmark, Mail Merge, Macros.

Spread Sheets:

Introduction to MS-Excel, Creating & Editing Worksheet, Formatting data, Formulas and Functions, Creating Charts, Pivot Tables.

Power Point Presentations:

Creating, Manipulating & Enhancing Slides, Organizational Charts, Animations & Sounds, Inserting Animated Pictures.

UNIT III

Operating Systems:

Introduction to Operating System: Functions of Operating System, Services; Properties: Batch Processing, Multitasking, Multiprogramming, Interactivity, Distributed environment, Spooling;

Types of Operating System:

Single user and Multiuser, Batch OS, Multiprogramming OS, Multitasking OS, Real-Time OS, Time-Sharing OS, Distributed OS, Network OS.

UNIT IV

Internet Basics:

History of Internet, Web Browsers, Web Servers, Hypertext Transfer Protocol, Internet Protocols Addressing, Internet Connection Types, How Internet Works, ISPs, Search Engines, Emails and Its Working, Internet Security, Uses of Internet, Computer Networks and their advantages, Types of Computer Network, Network Topologies, Basics of Transmission Media. Cloud Computing Basics: Overview, Applications, Intranets and the Cloud. Benefits, Limitations and Security Concerns.

Text/ Reference Books

1. Satish Jain, Kratika, M. Geetha, "MS Office", BPB Publications, 2010.
2. ITL Education Solutio, "Introduction to Computer Science", Pearson Education, 2nd Edition 2012.
3. P. K. Sinha, "Computer Fundamentals", 6th edition, 2003.
4. Tony Feldman,"Introduction to Digital Media", Routledge; 1 edition, 1996.
5. Bartee, Thomas C, "Digital Computer Fundamentals", McGraw-Hill Inc., 6th Edition, 1984.

CCsL 105
Core Course-II
Programming in 'C'
(Credits: 02, 30 Hrs (2Hrs/week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT – 1

Introduction to C Programming:

History of C, Character Set, Identifiers and Keywords,

Constants, Types of C Constants, Rules for Constructing Integer, Real and character Constants, Variables, Data Types, rules for constructing variables. Input/output: Unformatted & formatted I/O function, Input functions: scanf(), getch(), getche(), getchar(), gets(); output functions: printf(), putch(), putchar(), puts().

Operators and Expressions:

Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators, Type Conversion in Assignments, Hierarchy of Operations, Structure of a C program.

UNIT – II

Decision Control Structure:

Decision making Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder.

Loop Control Structure:

While and do-while, for loop and Nested for loop,

Case Control Structure:

Decision using switch; goto, break and continue statements.

Functions:

Library functions and user defined functions, Global and Local variables, Function Declaration, Calling and definition of function, Methods of parameter passing to functions, recursion, Storage Classes in C.

UNIT – III

Arrays:

Introduction, Array declaration, Accessing values in an array, Initializing values in an array, Single and Two Dimensional Arrays, Initializing a 2-Dimensional Array, Passing array elements to a function: Call by value and call by reference, Arrays of characters, Insertion and deletion operations, Searching the elements in an array, Using matrices in arrays, Passing an Entire Array to a Function.

Pointers:

Pointer declaration, Address operator "&", Indirection operator "*", Pointer and arrays, Pointers and 2-Dimensional Arrays, Pointer to an Array, Passing 2-D array to a Function, Array of Pointers.

Dynamic Memory Allocation:

malloc(), calloc(), realloc(), free() functions.

UNIT – IV

String Manipulation in C:

Declaring and Initializing string variables, Reading and writing strings, String Handling functions (strlen(), strcpy(), strcmp(), strcat(), strrev()).

Structures and Unions:

Declaration of structures, Structure Initialization, Accessing structure members, Arrays of structure, Nested structures, Structure with pointers, Union.

Files in C:

Introduction, Opening and Closing files, Basic I/O operation on files.

Text/ Reference Books:

1. Yashvant Kanetkar, "Let Us C", 15th Edition, BPB Publications, 2016.
2. Salaria, R.S. : Test Your Skills in C, Salaria Publications, New Delhi.
3. E. Balaguruswami : Programming with C Language, Tata McGraw Hill, New Delhi.
4. Byron S. Gottfried : Programming in C, McGraw Hills Publishers, New York.
5. M.T. Somashekara : Programming in C, Prentice Hall of India.

CCsP- 109
Practical –I: Computer Lab--I
Based on Computer Fundamentals
(Credits: 02, 60 Hours (4hrs. per week))

Marks: 50
Time: 4 Hours

List of Experiments:

Section- A

1. Create an admission form in MS-Word. You need to use Text-Boxes, Shapes, Colors, formatting options, table and horizontal lines.
2. Send a birthday invitation to your 100 friends using Mail-Merge.
3. Study and use various functions like Sum, Average, Maximum, and Minimum in MS-Excel.
4. Fill 50 students' records in MS-Excel sheet1. The fields must be Roll No., Name, Father Name, Course Joined, Marks obtained in three subjects. Create a marks-sheet in sheet2.
5. Create 10 slides in MS-PowerPoint related to internet advantages and disadvantages in daily life. Add animations to these all slides.

Section-B

1. Program to convert a given decimal number into its binary equivalent using bitwise operators.
2. Program to accept a positive integer and find the sum of the digits in it.
3. Find The Roots of Quadratic Equation using if else statement.
4. Program to generate prime numbers.
5. Program to multiply two matrices.
6. Program to find GCD and LCM using non-recursive function.
7. Program to generate terms of Fibonacci series using recursive function.
8. Program to read a string and check whether it is a palindrome or not (using library functions).
9. Program to create a file called emp.txt and store information about a person, in terms of his name, age and salary.
10. Program to add two complex numbers using structure to store a complex number.

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

CCsL- 204
Core Course-III
Data Structure Using 'C'
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT – 1

Data Structure Basics:

Introduction to Complexity, Introduction to Data Structures, Classification of data structure, Abstract data type; Data Structure Operations, Applications of Data Structure.

Arrays:

Definition of array, Single and Multi-dimensional Arrays, Representation of single and 2-dimentional arrays and their address calculation, basic operations on single dimensional arrays, Algorithm for insertion and deletion operations; Sparse Matrices and its representation.

Stacks:

Definition of stack, Operations on stack, Algorithms for push and pop operations using array. Stack Applications: Prefix, Infix and Postfix expressions, Conversion of Infix expressions to Postfix expression using stack; Recursion.

UNIT – II

Queues:

Introduction to Queue. Operations on Queues, Circular queue, Algorithm for insertion and deletion in simple queue and circular queue using array. De-queue, Priority Queues.

Linked Lists:

Introduction, Array vs Linked list; Singly, Doubly and Circular linked Lists and representation of linked lists in memory. Implementation of Stack and simple Queue as single Linked List.

UNIT -III

Trees:

Introduction to Tree as a data structure, Basic Terminology; Binary Trees, Traversal of binary trees: In-order, Pre-order & post-order. Binary tree non recursive traversal algorithms. Binary Search Tree, (Creation, and Traversals of Binary Search Trees)

Graphs:

Introduction, Memory Representation, Graph Traversal (DFS and BFS)

UNIT - IV

Searching:

Binary and Linear Search

Sorting:

Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick sort. Comparison of various Searching and Sorting algorithms.

Text/ Reference Books:

1. Ellis Horowitz & Sartaj Sahni, "Fundamentals of Data structures in C",2nd Edition, Silicon Press, 2007.
2. R. B. Patel, "Expert Data Structures with C", 3rd Edition, Khanna Book Publishing, 2014.
3. A. M. Tenenbaum, Langsam, "Data Structures using 'C'," Pearson Education, 2009.
4. Lipschuitz L. Seymour, 2001 : Data Structure, Schaum Outline Series, TMH, New Delhi.
5. Salaria, R. S. : Data Structures & Algorithm Using C, Khanna Book Publishing Co. (P.) Ltd., New Delhi.
6. Salaria, R. S., Test Your Skills in Data Structures, Khanna Book Publishing Co. (P.) Ltd., New Delhi.
7. Sofat Sanjeev, Data Structure with C and C++, Khanna Book Publishing Co. Patel, R.B., Expert Data Structure in C, Khanna Book Publishing Co.

CCsL- 205
Core Course-IV
COMPUTER ORGANISATION
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT – I

Data Representation:

Number Systems: Decimal, Binary, Octal, Hexadecimal, Conversion from one number system to other; Binary arithmetic operations, Representation of Negative Numbers: 1's complement and 2's complement; fixed and floating point representation, character representation (BCD, EBCDIC and ASCII Code), BCD number system; Weighted Codes, Self Complementing Code, Excess-3 code, Gray and Cyclic code.

UNIT – II

Boolean Algebra:

Introduction**,** Definition, Postulates of Boolean Algebra, Fundamental Theorems of Boolean Algebra; Duality Principle, Demorgan's Theorems, Boolean Expressions and Truth Tables, Standard SOP and POS forms, Canaonical representation of Boolean expressions, Simplification of Boolean Expressions using theorems of Boolean algebra, Minimization Techniques for Boolean Expressions using Karnaugh Map.

Logic Gates:

AND, OR, NOT, NOR, NAND & XOR Gates and their Truth tables.

UNIT – III

Combinational Circuits:

Half Adder & Full Adder, Half Subtractor & Full Subtractor, Adder & Subtractor, decoders, multiplexors. Realization of Boolean expressions using decoders and multiplexor.

Sequential Circuits:

Flip-Flops, Types- RS, T, D, JK and Master-Salve JK flip flop, Triggering of Flip Flops; Flip Flop conversions, Shift Registers, Synchronous and Asynchronous Counters.

UNIT – IV

Basic Computer Organization and Design:

Register Organization, Bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt.

Programming the Basic Computer:

Instruction formats, addressing modes, instruction codes.

Input-output Organization:

Peripheral devices, I/O interface, Modes of data transfer,

Direct Memory Access.

Text/ Reference Books:

1. William H.Gothman, "Digital Electronics-An Introduction to Theory and Practice" 2nd Edition, Prentice Hall of India Pvt. Ltd., 2009.
2. Mano, M. Morris,"Digital Logic and Computer Design", Prentice Hall of India Pvt.Ltd., 2000.
3. W.Stallings,"Computer Organization & Architecture", Pearson Education, 7th Edition, New Delhi, 2006.
4. N. Carter,"Computer Architecture", Schaums Outline Series, Tata McGraw Hill, New Delhi, 2006.

CCsP - 209

Practical –II: Computer Lab--II

Based on Data Structure using 'C' language and Database Management System
(Credits: 02, 60 Hrs (4Hrs /week))

Marks: 50
Time: 4 Hours

List of Experiments:

1. Program to convert a given infix expression to postfix.
2. Program to insert/delete an element in/from an array at a given location.
3. Program to implement Stack using structure
4. Program to implement Single Queue using structure
5. Program to insert, delete and display the linked list (Beginning, End and given position)
6. Program to generate BST and traverse recursively (infix).
7. Program to generate BST and traverse recursively (prefix).
8. Program to generate BST and traverse recursively (postfix).
9. Program for Binary Search.
10. Program for sorting an array using any sorting technique

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

SEMESTER I & II

B. SC. PHYSICAL SCIENCE

(COMPUTER APPLICATIONS)

CCaL-104
Core Course-I
COMPUTER FUNDAMENTALS AND OPERATING SYSTEM
(Credits: 02, 30 Hrs (2Hrs /week))
Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. I is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. I is compulsory.

UNIT - I

Introduction: Characteristics, evolution and generations of computers, Basic Computer Organization: Input and Output Unit, Primary and Secondary storage, CPU: ALU, Control Unit, Classification of computers, Number Systems: Binary, Hexadecimal, Octal, Decimal numbers, Floating-point Numbers, Computer codes: BCD and EBCDIC codes, ASCII, Unicode.

UNIT - II

Input/Output & Storage Units-: Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, Monitors – characteristics and types of monitor -Digital, Analog, Size, Resolution, Refresh Rate, Interlaced / Non Interlaced, Printers& types – Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card and Speakers

UNIT – III

Memories: Memory speed, access time, wait states, Types of memory, Dynamic and Static RAM, memory chip making, Cache memory, shadow RAM, ROM chips, Reading memory error messages, adding RAM, CPU Registers Storage fundamentals - Secondary Data Storage and Retrieval methods - Sequential, Direct and Index Sequential, Various Storage Devices Magnetic Tape, Magnetic Disks, Cartridge Tape, Hard Disk Drives, Floppy Disks, CD/DVD flash drives Video Disk , Blue Ray Disc

UNIT - IV

Windows OS: Operating system definition and evolution, Types of Operating Systems, Functions of operating systems, Popular Operating Systems, Features of Windows OS, Windows history;Files & Folders operations. Desktop, Recycle Bin, My Computer, My Documents, Windows Explorer, Configuring System Devices: Control Panel, Accessories in Windows.

TEXT BOOKS

1. PC Hardware Complete Reference - Craig Zacker & John Rourke, Tata McGraw Hill

2. Inside the PC - Peter Norton, BPB.

3. Foundation of Computing, Sinha P., Sinha P., BPB Publication

REFERENCES BOOKS

1. The Indispensable PC Hardware Book - Messmer, Pearson Education

2. Troubleshooting and Repairing Your PC - Corey Candler, Wiley

3. Upgrading and repairing PC’s - Scott Mueller, Pearson Educati

CCaL 105
Core Course-II
Office Automation Tools
(Credits: 02, 30 Hrs (2Hrs/week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT – I

MS PowerPoint: Introduction & area of use; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide;Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options. Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect. Outlook Express: Features and uses, Configuring and using Outlook Express for accessing e-mails in office.

UNIT-II

MS Word: Introduction area of use, Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document; Different Page Views and layouts; Applying various Text Enhancements; Working with – Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features ; Bullets, Numbering, Auto formatting, Printing. Spell Check, Thesaurus, Find & Replace; Headers & Footers ; Inserting – Page Numbers, Pictures, Files, Autotexts, Symbols etc.; Working with Columns, Tabs & Indents; Creation & Working with Tables; Margins & Space management in Document; Adding References and Graphics; Mail Merge, Envelops & Mailing Labels. Importing and exporting to and from various formats.

UNIT – III

Excel: Creating & Saving work book. Structure of Worksheet, entering & editing data, Copying & Moving data, Finding & Replacing data. Filling Data. Sorting data. Formatting Data – Number Style Format, Border & Color, Rotating Texts, Conditional Formatting. Arranging Multiple Workbooks or Windows, Hiding & Unhiding – workbooks, worksheets, rows & columns. Inserting Columns & Rows. Adjusting widths & Heights of Columns & Rows. Copying, moving, inserting, deleting & renaming worksheets in workbooks. Defining, Inserting & deleting Cell or Range Names.

UNIT – IV

Formulas & Functions: Mathematical operators. Creating, changing & copying formulas. Absolute referencing. Functions – Log, Sum, Average, Count, If, Max, Sum If. Date & Time, Database, Text, Maths & Statistical functions. Charts in Excel: Types of charts, Inserting & Modifying charts. File & Print Operations. Linking Worksheets & Workbooks. Creating lists, Using Filters & Subtotals. Recording, running and editing Macros. Data Validation. What-if analysis using Goal seek and scenarios.

TEXT BOOKS

1. Microsoft Office – Complete Reference – BPB Publication

2. Learn Microsoft Office – Russell A. Stultz – BPB Publication

REFERENCES BOOKS

1. Courter, G Marquis. Microsoft Office 2000: Professional Edition. BPB.

2. Koers, D . Microsoft Office XP Fast and Easy. PHI.

3. Nelson, S L and Kelly, J . Office XP: The Complete Reference. Tata McGraw-Hill.

CCaP-109
Practical-I: Computer Lab--1
(Credits: 02, 60 Hours (4hrs. per week))

Marks: 50
Time: 4 Hours

List of Experiments:
Section-A

1. Create an admission form in MS-Word. You need to use Text-Boxes, Shapes, Colors, formatting options, table and horizontal lines.

2. Send a birthday invitation to your 100 friends using Mail-Merge.

3. Study and use various functions like Sum, Average, Maximum, and Minimum in MSExcel.

4. Fill 50 students' records in MS-Excel sheetl. The fields must be Roll No., Name, Father Name, Course Joined, Marks obtained in three subjects. Create a marks-sheet in sheet2.

5. Create 10 slides in MS-PowerPoint related to internet advantages and disadvantages in daily life. Add animations to these all slides.

   Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

CCaL-204
Core Course-I
INFORMATION TECHNOLOGY
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT – I

Information Technology Basics, Role of IT. PC evolution, PC classifications, Introduction to Microprocessors.

Inside the PC system unit: PC system unit layout; Motherboard, Memory, Expansion slots and Adapter cards, SMPS, Display unit, Keyboard, Rear side connectors, System Buses, Local Buses

Communication with peripherals: Serial ports, Parallel port, Game Port, USB Port, Fire-Wire Port, HDMI Port, Upgrading PC for Multimedia.

UNIT – II

Information Tools for management control: Decision Support System, Executive Information System, Geographical Information System, On-Line Analytical processing, Data Warehousing, Data Mining, Web advertising, Presentations, Electronic Catalogues

Computer Security: Introduction, Malicious Programs, Digital Signature, Firewall, User Identification and Authentication.

UNIT – III

Emerging Trends in IT: E-Commerce, Electronic Data Interchange(EDI), Mobile Communication, Bluetooth, Global Positioning System(GPS), Smart Cards Multimedia: Definition and building blocks, Hardware, Software and Applications, Multimedia presentation devices, Virtual Reality Digital Sound data: MIDI, Data Compression.

UNIT – IV

Data communications and Computer Networks: Basic Components, Transmission media, Switching, Multiplexing, Modulation, Network Technologies, network types, Communication Protocols, Wireless networks, The Internet: History, Basic services, WWW, browsers, Service

providers, Internet naming and addressing - Electronic mail, Remote login, File Transfer, Search Engine, Getting connected to the Internet.

TEXT BOOKS

1. Sinha P., Sinha P., “Foundations of Computing”, BPB Publication

2. Brain, K. Williams et. al., Using Information Technology, TMH.

REFERENCE BOOKS

1. Turban, Rainer, Potter, Introduction to Information Technology, second edition, Wiley Publications.

2. Dennis P. Curtin, et. al., Information Technology - The Breaking View, TMH.

3. Rajaraman V., “Computer Fundamentals”

CCaL-205
Core Course-IV
PROGRAMMING IN 'C'
(Credits: 02, 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions are to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question No. 1 is compulsory.

UNIT-I

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Techniques of Problem Solving: Flowcharting, algorithms, pseudo code, decision table, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Searching, Sorting, and Merging: Linear & Binary Searching, Bubble, Selection, and Insertion Sorting, Merging.

UNIT-II

Structure of a C Program, C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant. Input/output: Unformatted & formatted I/O function.

Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

UNIT-III

Control statement in C: Branching - Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switches statement, go to statement. Looping: For, while, and do-while loop, jumps in loops, break, continue statement.

UNIT-IV

Functions: Definition, prototype, passing parameters, recursion. Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.

Arrays: Definition, types, initialization, processing an array

TEXT BOOKS

1. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB

2. Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill

REFERENCE BOOKS

1. Dromey, R.G., How to Solve it By Computer, PHI

2. Gottfried, Byron S., Programming with C, Tata McGraw Hill

3. Norton, Peter, Introduction to Computer, McGraw-Hill

4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World

5. Rajaraman, V., Fundamentals of Computers, PHI

CCaP-209 Practical-II: Computer Lab--11
(Credits: 02, 60 Hrs (4Hrs /week))

Marks: 50
Time: 4 Hours

List of Experiments:

1. Program to convert a given decimal number into its binary equivalent using bitwise operators.
2. Program to accept a positive integer and find the sum of the digits in it.
3. Find The Roots of Quadratic Equation using if else statement.
4. Program to generate prime numbers.
5. Program to multiply two matrices.
6. Program to find GCD and LCM using non-recursive function.
7. Program to generate terms of Fibonacci series using recursive function.
8. Program to read a string and check whether it is a palindrome or not (using library functions).

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

(MATHEMATICS)

CML 106
Core Course-I
ALGEBRA
(Credits: 04; 60 Hrs (4Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

The examiner is requested to set nine questions in all, selecting two questions from each Unit. Question no. 1 is compulsory and is based on entire syllabus consisting of eight to ten short answer type questions each of 2 marks. Candidates are required to attempt five questions in all, selecting one question from each Unit and Question no. 1 is compulsory wherein student is required to attempt 8 parts.

Course Objective	Course Outcome
The course on Algebra deals with advance topics on matrices viz. rank, eigen values and homogeneous and non homogeneous systems, solution of cubic and bi-quadratic equations and DeMoivre's theorem.	The student will be able to find the rank, eigen values of matrices and solve the homogeneous and non homogeneous systems, solution of cubic and bi-quadratic equations.

Unit-I

Matrices, Symmetric, Skew-Symmetric, Hermitian and Skew-Hermitianmatrics. Rank of a matrix. Linear dependence and independence of rows and columns of matrices.Row Equivalent matrices and column equivalent Matrices, Reduction to a Row and Column Mtrices, Normal form of a Matrix, Row rank and column rank of a matrix. Eigen values, eigen vectors and the characteristic equations of a matrix.

Unit-II

Minimal polynomial of a matrix.Cayley Hamilton theorem.Applications of matrices to a system of linear(both homogeneous and non-homogenous) equations. Theorems of consistency of a system of linear equations.Unitary and Orthogonal Matrices, Bilinear Form and Quadratic Form.

Unit-III

Discarte' Rule of Signs, Relations between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots.Common roots and multiple roots. Transformation of equations into equations with roots multiplied by a given number, Equation with Reciprocal Roots, Roots Diminished by a given number.

Unit-IV

Solutions of cubic equations by Cardan's method, Discarte' Method and Ferarri Method.Biquadratic equations and their solutions.DeMoivre's theorem. Its applications in solutions of polynomials equations, Finding the n^{th} root of a number.

Books Recommended :

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

CML 107
Core Course -II
CALCULUS
(Credits: 04; 60 Hrs (4Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

The examiner is requested to set nine questions in all, selecting two questions from each Unit. Question no. 1 is compulsory and is based on entire syllabus consisting of eight to ten short answer type questions each of 2 marks. Candidates are required to attempt five questions in all, selecting one question from each Unit and Question no. 1 is compulsory wherein student is required to attempt 8 parts.

Course Objective	Course Outcome
The course on differential Calculus deals with some important concepts of limit, continuity, differentiability of functions and tracing of curves.	The student will be able to understand basic properties ofLimit, continuity and derivability of functions, series expansion indeterminate forms, tracing of curves with the help of asymptotes and singular points..

Unit-I

Limit, continuity (– definition), Types of Discontinuties and differentiability of functions.Successive differentiation of functions in imlicit, explicit and parametric form.Lebnitz theorem.Some general theorems on differentiable functions and expansions. Taylor's theorem with Langrange's form and Cauchy' form of remainder after 'n' terms.Maclaurinform and Infinite Series.

Unit-II

Asymptotes parallel to coordinate axis and Oblique Assymptotes in Cartesian and Polar form.Singular points.Points of inflexion. Multiple points. Cusps,nodes & conjugate points.Tracing of curves in Cartesian, parametric and polar co-ordinates, particularly, Asteroid, Cycloid and Cardoid.

Curvature (radius of curvature for Cartesian curve, parametric curves, polar curves, pedal curves)..

Unit-III

Reduction formulae. Rectification, length of cuves in Cartesian, parametric and polar curves particularly Asteroid, Cycloid and Cardoid., intrinsic equations of curve.

Unit-IV

Quardrature (area)Sectorial area. Area bounded by closed curves in Cartesian, parametric form and polar form. Volumes and surfaces of solids of revolution about x-axis and about any line.

Books Recommended

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3. George B. Thomas, Jr., Ross L. Finney : Calculus and Analytic Geometry, Pearson Education (Singapore); 2001.
4. T.M. Apostal : Calculus, vol. 1, John Wiley and Sons (Asia) : 2002.
5. A.I. Kostrikin: Introduction to Algebra, Springer Verlag, 1984.
6. Differential and Integral Calculus : Shanti Narayan.
7. . Murray R. Spiegel : Theory and Problems of Advanced Calculus. Schaun's Outline series. Schaum Publishing Co., New York.
8. N. Piskunov : Differential and integral Calculus. Peace Publishers, Moscow.
9. GorakhPrasad : Differential Calculus. Pothishasla Pvt. Ltd., Allahabad.

CMP 110
PRACTICAL-I
Mathematics Lab– I
(Credits: 1.5; 45 Hrs (3Hrs /week)))

Marks for Major Test (External): 50
Time: 3 Hours

Course Objective	Course Outcome
The course on Practical deals with some important concepts of Programming in C.	The student will be able to solve and calculate the mathematical problems through programming.

Part A: Introduction to Programming in C

Data types, Operators andexpressions, Input / outputs functions. Decisions control structure: Decision statements, Logical and conditional statements, Implementation of Loops-for, while, do while; Switch Statement & Case control structures.

Part B:

Following Program should be done as Practical:-

1. Program to interchange the value of two variables.
2. Program to calculate compound interest.
3. Program for testing a leap year.
4. Program to find greatest of three numbers.
5. Program to calculate Gross salary of an employee.
6. Program to prepare electricity Bill.
7. Program to find roots of a quadratic equation.
8. Program to provide output of a given function.
9. Program to display table of an input number
10. Program to find reverse of a number
11. Program to generate Fibonacci series.
12. Program to check whether number is prime or not.
13. Program to generate first n prime numbers.
14. Program to check a number is Armstrong or not.
15. Program to convert a number to its binary equivalent.

Books Recommended:

1. B.W. Kernighan and D.M. Ritchie : The C Programming Language, 2nd Edition
2. V. Rajaraman : Programming in C, Prentice Hall of India, 1994
3. Byron S. Gottfried : Theory and Problems of Programming with C,
Tata McGraw-Hill Publishing Co. Ltd., 1998

4. M.K. Jain, S.R.K.Lyengar, R.K. Jain : Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996
5. M.K. Jain, S.R.K. Lyengar, R.K. Jain : Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999
6. Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd.
7. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill Publishing Co.Ltd.

CML 206
Core Course – III
VECTOR CALCULUS AND GEOMETRY
(Credits: 04; 60 Hrs (4Hrs /week)))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

The examiner is requested to set nine questions in all, selecting two questions from each Unit. Question no. 1 is compulsory and is based on entire syllabus consisting of eight to ten short answer type questions each of 2 marks. Candidates are required to attempt five questions in all, selecting one question from each Unit and Question no. 1 is compulsory wherein student is required to attempt 8 parts.

Course Objective	Course Outcome
The course on Vector Calculus and Geometry deals with topics on vectors and geometry viz. directional derivatives, gradient, curl, two and three dimensional geometry.	The student will be able to find directional derivatives, gradient, curl. Laplacian operator, two and three dimensional geometry.

Unit – I

Scalar and vector product of three vectors, product of four vectors.Reciprocal vectors. Vector differentiation Scalar Valued point functions, vector valued point functions, derivative along a curve, directional derivatives.Gradient of a scalar point function, geometrical interpretation of grad .Divergence and curl of vector point function.

Unit – II

Gradient, divergence and curl of sums and product and their related vector identities.Laplacian operator.Orthogonal curvilinear coordinates Conditions for orthogonality fundamental triad of mutually orthogonal unit vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinates, Cylindrical co-ordinates and Spherical co-ordinates.

Unit – III

Vector integration: Indefinite Integral, Definite Integral,Standard results of Integration.Line integral, Surface integral, Volume integral. Gauss Divergence Theorem, Divergence Theorem in Cartesian Co-ordinates, Green Theorem, Stoke's Theorem(Relation between line Integral and Surface Integral). Stoke's Theorem in Cartesian form. Green's Theorem in Plane as special case of Stoke's Theorem, problems based on these theorems.

Unit -IV

Geometry: General equation of second degree. Tracing of conics.Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic.Polar equation of a conic, tangent and normal to the conic.Sphere: Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, Cones. Right circular cone.Cylinder: Right circular cylinder.

Books Recommended:

1. Murrary R. Spiegal : Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.
2. Murrary R. Spiegal : Vector Analysis, SchaumPublisghing Company, New York.
3. N. Saran and S.N. NIgam. Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.
4. Shanti Narayna : A Text Book of Vector Calculus. S. Chand & Co., New Delhi.

CML 207

Core Course – IV

ORDINARY DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

(Credits: 04; 60 Hrs (4Hrs /week)))

Marks for Major Test (External): 80

Marks for Internal Exam: 20

Time: 3 Hours

The examiner is requested to set nine questions in all, selecting two questions from each Unit. Question no. 1 is compulsory and is based on entire syllabus consisting of eight to ten short answer type questions each of 2 marks. Candidates are required to attempt five questions in all, selecting one question from each Unit and Question no. 1 is compulsory wherein student is required to attempt 8 parts.

Course Objective	Course Outcome
The course on ordinary differential equations and Laplace Transforms deals with some important concepts: Exact differential equations, Orthogonal trajectories, Linear differential equations with variable & constant coefficients and solution of ordinary differential equations using Laplace Transforms.	The student will be able to understand basic properties of differential equations, Orthogonal trajectories, Linear differential equations. Apart from this the students will be able to solve ODE by Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Method of variations of parameters. Solution of Simultaneous Differential Equations and Total Differential Equations. Student will also be able to understand basic properties of Laplace and Inverse Laplace Transforms and solution of ordinary differential equations using Laplace Transform

Unit – I

Geometrical meaning of a differential equation.Exact differential equations, integrating factors. First order higher degree equations solvable for x,y,p Lagrange's equations, Clairaut's equations. Equation reducible to Clairaut's form.Singular solutions.

Unit – II

Orthogonal trajectories: in Cartesian coordinates and Polar coordinates. Self orthogonal family of curves.Linear differential equations with constant coefficients.Homogeneous linear ordinary differential equations. Equations reducible to homogeneous.

Unit – III

Linear differential equations of second order.Reduction to normal form.Transformation of the equation by changing the dependent variable/ the independent variable.Solution by operators of non-homogeneous linear differential equations.Reduction of order of a differential equation.Method of variations of parameters.Ordinary simultaneous differential equations.Solution of simultaneous differential equations.

Unit – IV

Laplace Transforms –Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives,solution of ordinary differential equations using Laplace transform.

Books Recommended :

1. D.A. Murray : Introductory Course in Differential Equations. Orient Longaman (India) . 1967
2. A.R.Forsyth : A Treatise on Differential Equations, Machmillan and Co. Ltd. London
3. E.A. Codington : Introduction to Differential Equations.
4. S.L.Ross: Differential Equations, John Wiley & Sons
5. B.Rai& D.P. Chaudhary : Ordinary Differential Equations; Narosa, Publishing House Pvt. Ltd.
6. M.D. Raisinghania :Ordinary and Partial Differential Equations.
7. Dyke,Phil : An introduction to Laplace Transforms and Fourier Series,Springer Undergraduate Mathematics Series.

CMP 210

PRACTIAL-II : Mathematics Lab – II

(Credits: 1.5; 45 Hrs (3Hrs /week)))

Marks for Major Test (External): 50

Time: 3 Hours

Course Objective	Course Outcome
The course on Practical deals with some important concepts of vectors geometry and ODE.	The student will be able to solve and calculate the mathematical problems through programming.

Part A: Introduction to Programming in C

Strings: Character data type, Standard string handling functions, arithmetic operations on characters. Structures: definition, using structures, use of structures in arrays and arrays in structures, Functions.

Part B:

Following Program should be done as Practical:-

16. Program to add two matrices.
17. Program to multiply two matrices.
18. Program to find the inverse of a matrix.
19. Program to find transpose of a matrix.
20. Program to find the sum of a series.
21. Program to sort an entire array using bubble short.
22. Program to find trace of 3X3 Matrix.
23. Program to find largest of three numbers using function.
24. Program to find factorial of a number using recursion.
25. Program to generate n Fibonacci terms using recursion.
26. Program to count number of vowels and consonants in a given sentence.
27. Program to print a salary chart for employee of a company.

Books Recommended:

1. B.W. Kernighan and D.M. Ritchie : The C Programming Language, 2nd Edition

2. V. Rajaraman : Programming in C, Prentice Hall of India, 1994

3. Byron S. Gottfried : Theory and Problems of Programming with C, Tata

McGraw-Hill Publishing Co. Ltd., 1998

4. M.K. Jain, S.R.K. Lyengar, R.K. Jain : Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996

5. M.K. Jain, S.R.K. Lyengar, R.K. Jain : Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999

6. Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd.

7. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill Publishing Co.Ltd.

SEMESTER I & II

B. SC. PHYSICAL SCIENCES

AWARENESS PROGRAM COMPULSARY COURSE

(ENVIRONMENTAL STUDIES)

CYL-201
Awareness Program Compulsory Course
ENVIRONMENTAL STUDIES
(Credits: 02; 30 Hrs (2Hrs /week))

Marks for Major Test (External): 80
Marks for Internal Exam: 20
Time: 3 Hours

Paper setter is required to set nine questions in all. Question no. 1 is Compulsory and is based on the entire syllabus consisting of eight to ten short answer type questions each of 2 marks. The remaining eight questions is to be set uniformly having two questions from each unit. The student is required to attempt five questions in all selecting one question from each unit and Question no. 1 is Compulsory wherein student is required to attempt 8 parts.

UNIT – I

The Multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness. Natural resources: Renewable and non-renewable resources Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation b) Water resources: Use and over-utilization of surface and ground water, floods and drought. c) Mineral resources: Use and exploitation, environmental effects of extrading. d) Food resources: World food problems, changes caused by agriculture, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. e) Energy Resources: Growing energy needs, renewable and non renewable energy sources use of alternative energy sources. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

Unit-II

Ecosystems Concept of an ecosystem, Structure and function of an ecosystem, Procedures, consumers and decomposers, Energy flow in the ecosystem, Ecological succession & Food chains, food webs and ecological pyramids. Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a megadiversity nation.

Unit-III

Environmental Pollution Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution & Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Unit-IV

Social Issues and the 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. Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, 7 ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, Consumerism and waste products, environment 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 environment legislation & Public awareness.

Reference books:

1. De A. K. Environmental Chemistry, Wiley Eastern Ltd, 1999.

2. Bharucha E. Text book of Environmental studies, University press, Hydrabad 2005.

3. Cunningham W P., Cooper T H. Gorhani E. Hepworth M T, Environmental Enclopedia, Jaico publication House, Mumbai, 2001.

4. Miller T G. Environmental Science Wadsworth publishing corp, 2000.