The Gandhigram Rural Institute
(Deemed to be University)

Gandhigram - 624302
(Ministry of Human Resource Development, Govt. of India)Accredited by NAAC with 'A' Grade (3rd cycle)

Department of Education

B.Sc.B.Ed., (Integrated)- Physics Syllabus

2018-19 Onwards

THE GANDHIGRAM RURAL INSTITUTE – DEEMED TO BE UNIVERSITY
B.Sc. Physics Programme – Choice Based Credit System (CBCS) (2018-2019) and afterwards

Semester	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks CFA	ESE	Total
						CFA	**ESE**	**Total**
I	18TAMU0101/ 18HIDU0101 / 18MALU0101/ 18FREU0101	Language I	Tamil/Hindi/ Malayalam/French	3	3	40	60	100
	18ENGU 01X1	Language II	English	3	3	40	60	100
	18NSSU 0001/ 18FATU0001/ 18SPOU 0001	Foundation Course	NSS/ Fine Arts/Sports	1	-	-	-	-
	18PEYU0001	Foundation Course	Yoga	1	-	50	-	50
	18EVSU0001	Environmental Science	Environmental Science	3+1	-	40	60	100
	18PHYU0101	Core Course	Mechanics & Properties of Matter	3	3	40	60	100
	18PHYU0102**	Core Course	Practical – I**	1	3	60	40	100
	18MATU01A1	Allied Course	Allied Mathematics I	4	3	40	60	100
			Total	**20**		**310**	**340**	**650**
II	18TAMU0202/ 18HIDU0202 / 18MALU0202/ 18FREU0202	Language I	Tamil/Hindi/ Malayalam/French	3	3	40	60	100
	18ENGU02X2	Language II	English	3	3	40	60	100
	18CTAU0001/ 18CHIU0001/ 18CMAU001	Language -III	Core Tamil / Core Hindi/ Core Malayalam	2	3	20	30	50
	18GTPU0001	Foundation Course	Gandhi's Life, Thought and Work	2	2	20	30	50
	18EXNU0001	Foundation Course	Extension Education	2	-	-	-	-
	18ENGU00C1	Soft Skills	Communication and Soft Skills	2	-	-	-	-
	18PHYU0203	Core Course	Optics	3	3	40	60	100
	18PHYU0204		Practical – II	1	3	60	40	100

	18MATU02A2	Allied Course	Allied Mathematics II	4	3	40	60	100
			Total	**22**		**260**	**340**	**600**

III	18TAMU0303/ 18HIDU0303 / 18MALU0303/ 18FREU0303	Language I	Tamil/Hindi/ Malayalam/French	3	3	40	60	100
	18ENGU03X3	Language II	English	3	3	40	60	100
	18CTAU0002 /18CHIU0002	Language III	Core Tamil/ Core Hindi	2	3	20	30	50
	18SHSU0001	Part V	Shanthi Sena	1	2	20	30	50
	18CSAU03C1	Computer Skill	Introduction to Computer and Programming in C	3	3	40	60	100
		Computer Skill	C practical	1	2	30	20	50
	18PHYU0305	Core Course	Thermal Physics	3	3	40	60	100
	18PHYU0306**		Practical – III**	1	3	60	40	100
	18CHEU03A1	Allied Course	Allied Chemistry I	3	3	40	60	100
	18CHEU03A2		Allied Chemistry - Practical I	1	3	30	20	50
	18PHYU03F1	Compulsory Non Credit Course	Extension and Field Visit	-	-	-	-	-
	18EXNU03V1	VPP	Village Placement Programme	2	-	100		100
			Total	**23**		**460**	**440**	**900**
IV	18PHYU0407	Core Course	Analog and Digital Electronics	4	3	40	60	100
	18PHYU0408		Atomic Physics and Lasers	4	3	40	60	100
	18PHYU0409		Mathematical Physics	3	3	40	60	100
	18PHYU0410		Practical – IV	2	6	60	40	100
	18CHEU04A3	Allied Course	Allied Chemistry II	3	3	40	60	100
	18CHEU04A4		Allied Chemistry - Practical II	1	3	30	20	50
	18PHYU04EX	Major Elective	Major Elective I	3	3	40	60	100
		Non Major Elective	Non Major Elective I	3	3	40	60	100
			Total	**23**		**330**	**420**	**750**

V	18PHYU0511	Core Course	Electromagnetics	4	3	40	60	100
	18PHYU0512		Nuclear and Particle Physics	3	3	40	60	100
	18PHYU0513		Classical Mechanics & Relativity	4	3	40	60	100
	18PHYU0514**		Practical – V**	2	6	60	40	100
	18PHYU05EX	Major Elective	Major Elective II	3	3	40	60	100
		Non Major Elective	Non Major Elective II	3	3	40	60	100
	18PHYU05S1	Skill Based Elective		2	2	50	-	50
		Part III	Extension/ Field visit	-	-	-	-	-
Total				**21**		**310**	**340**	**650**
VI	18PHYU0615	Core Course	Solid State Physics	3	3	40	60	100
	18PHYU0616		Quantum Mechanics	4	3	40	60	100
	18PHYU0617		Spectroscopy	4	3	40	60	100
	18PHYU0618		Practical - VI	2	6	60	40	100
	18PHYU0619		Project (CFA 40 + External 40 + Viva 20)	0 + 4	-	40	40+20	100
	18PHYU06MX 18PHYU06MX	Modular Course on SRS (Any 2 Modules)	Modular Course I Modular Course II	2 2		50 50		50 50
		Part III	Extension/Field visit	-				
Total				**21**		**320**	**280**	**600**
Grand Total				**130**				

List of major elective   (at least three to be provided)

18PHYU04E1	Solar Thermal & Renewable Energy Systems
18PHYU04E2	Introduction to Astrophysics
18PHYU04E3	Waves and Oscillations

List of major elective   (at least three to be provided)

18PHYU05E4	Instrumentation
18PHYU05E5	Television Transmission & Receiver
18PHYU05E6	Micro Processor 8085 Programming

Skill Based Elective

18PHYU05S1	Instruments and Servicing
18PHYU05S2	Applied Optics
18PHYU05S3	Weather Forecasting

List of non-major elective (at least three to be provided)

18PHYU04N1	Solar Thermal & Renewable Energy Systems
18PHYU04N2	Physics of Sports
18PHYU04N3	Physics of Music

List of non-major elective (at least three to be provided)

18PHYU05N4	Instruments & Servicing
18PHYU05N5	Agricultural Physics
18PHYU05N6	Numerical Methods

List of modular courses (at least four to be provided)

18PHYU06M1	Statistical Mechanics
18PHYU06M2	Electric Circuit Analysis
18PHYU06M3	Optic Communication
18PHYU06M4	Radiation safety

Courses offered to the other Departments:

18PHYU01A1 / 18PHYU03A1	Allied Physics – I (Allied Physics for B.Sc., Mathematics and Chemistry Major)
18PHYU02A1 / 18PHYU04A1	Allied Physics – II (Allied Physics for B.Sc., Mathematics and Chemistry Major)
18AGPU0201	Fundamentals of Agricultural Physics (For B.Sc. Agriculture)
18PHYU01C1	Engineering Physics (For B.Tech)
18PHYU01C2	Engineering Physics Lab (For B.Tech)

B.Sc. Physics
SCHEME FOR MAJOR PHYSICS COURSES (2018-2019 AND AFTERWARDS)

Semester	Course Code	Course Title	No of Credits			Duration of ESE(Hrs)	Marks		Total
			L	P	T		CFA	ESE	
I	18PHYU0101	Mechanics & Properties of Matter	3	-	3	3	40	60	100
	18PHYU0102	Practical - I**	-	1	1	3	60	40	100
II	18PHYU0203	Optics	3	-	3	3	40	60	100
	18PHYU0204	Practical - II**	-	1	1	3	60	40	100
III	18PHYU0305	Thermal Physics	3	-	3	3	40	60	100
	18PHYU0306	Practical - III**	-	1	1	3	60	40	100
	18PHYU03F1	Extension / Field Visit	-	-	-	-	-	-	-
	18CSAU03C1	Introduction to Computer and Programming in C	3	1	4	3	40	60	100
IV	18PHYU0407	Analog and Digital Electronics	4	-	4	3	40	60	100
	18PHYU0408	Atomic Physics and Lasers	4	-	4	3	40	60	100
	18PHYU0409	Mathematical Physics	3	-	3	3	40	60	100
	18PHYU0410	Practical - IV**	-	2	2	3	60	40	100
	18PHYU04EX	Major Elective – I	3	-	3	3	40	60	100
		Non Major Elective - I	3	-	3	3	40	60	100
	18PHYU00F2	Extension / Field Visit	-	-	-	-	-	-	-
V	18PHYU0511	Electromagnetics	4	-	4	3	40	60	100
	18PHYU0512	Nuclear and Particle Physics	3	-	3	3	40	60	100
	18PHYU0513	Classical Mechanics & Relativity	4	-	4	3	40	60	100
	18PHYU0514	Practical - V**	-	2	2	3	60	40	100
	18PHYU05EX	Major Elective – II	3	-	3	3	40	60	100
		Non Major Elective - II	3	-	3	3	40	60	100
	18PHYU05S1	Skill Based Courses	-	1	1	3	50		50
VI	18PHYU0615	Solid State Physics	3	-	3	3	40	60	100
	18PHYU0616	Quantum Mechanics	4	-	4	3	40	60	100
	18PHYU0617	Spectroscopy	4	-	4	3	40	60	100
	18PHYU0618	Practical - VI**	-	2	2	3	60	40	100
	18PHYU0619	Project* (CFA-40, External -40 + viva-voce 20)	-	-	3		40	40+20	100
	18PHYU06MX	Modular Course-I	2	-	2	-	50	-	50
	18PHYU06MX	Modular Course-II	2	-	2	-	50	-	50
		TOTAL	**61**	**11**	**75**	**72**	**1230**	**1320**	**2550**
	* 25 marks to be awarded by external examiner for project and 25 marks for Viva-Voce jointly by supervisor and external examiner.								
	** For practical I & II ESE will be held at the end of II semester while for practical III & IV ESE will be held at the end of IV semester and for practical V & VI ESE will be held at the end of VI semester.								

GANDHIGRAM RURAL INSTITUTE – DEEMED UNIVERSITY
B.Sc., Physics Programme – Choice Based Credit System (CBCS)
Courses for the batches joining in 2018-2019 and afterwards

S.No	Category	Title of the Course	I Sem			II Sem			III Sem			IV Sem			V Sem			VI Sem			Total		
			L	P	T	L	P	T	L	P	T	L	P	T	L	P	T	L	P	T	L	P	T
01	Language I	Tamil/Hindi/Malayalam/French	3	-	3	3	-	3	3	-	3	-	-	-	-	-	-	-	-	-	9	-	9
02	Language II	English	3	-	3	3	-	3	3	-	3	-	-	-	-	-	-	-	-	-	9	-	9
03	Basic language	Hindi/Tamil	-	-		2	-	2	2	-	2	-	-	-	-	-	-	-	-	-	4	-	4
04	Foundation Course	NSS/Shanti Sena/Fine Arts/Sports	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
05	Foundation Course	Yoga	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
06	Foundation Course	Environmental Science	3	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	4
07	Foundation Course	Gandhian Thought	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
08	Foundation Course	Extension Education	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
09	Soft Skills		-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-		2	-	2
10	Computer Skills		-				-		4 (3+1)	-	4 (3HT+2HP)	-	-	-	-	-	-	-	-	-	4	-	4
11	VPP		-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	2	-	2
12	Compulsory Non Credit Course	Extension/Field Visit	-	-	-	-	-	-	-	-	2 Hrs	-	-	2 Hrs	-	-	2 Hrs	-	-	-		-	-
13	Non Major Elective		-	-	-	-	-	-	-	-	-	3	-	3	3	-	3	-	-	-	6	-	6
14	Major Elective		-	-	-	-	-	-	-	-	-	3	-	3	3	-	3	-	-	-	6	-	6
15	Skill Based Elective		-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-		2	-	2
16	Modular Course on SRS(Any 2 Modules)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 2	- -	2 2	-	4	4
17	Allied Course		4	0	4 M	4	0	4 M	3 (3H)	1 (3H)	4 C	3 (3H)	1 (3H)	4 C	-	-	-	-	-	-	12	4	16
18	Core Course		3 (3H)	1 (3H)	4	3 (3H)	1 (3H)	4	3 (3H)	1 (3H)	4	11	2 (6H)	13	11	2 (6H)	13	11	2 (6H)	13	42	9	51
19	Project		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	4	-	4
		TOTAL	18	2	20	20	2	22	18	2	20	20	3	23	19	2	21	19	2	21	110	17	127
		Grand Total			20			22			20			23			21			21			127

B.Sc. Physics – I Semester
18PHYU0101 – Mechanics and Properties of Matter (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

.**Objectives:**

        To impart knowledge about linear and rotational motion of bodies and gravitational forces among bodies.

        To make them understand the principles and methods of finding the bulk properties of structural materials.

        To know about the physical and flow properties of liquids

Specific learning outcomes: At the end of the course the student should be able to

    CO-1: Specify the principles and types of collision between bodies.

    CO-2: State the Newton's second law and conservation of angular momentum.

    CO-3: Estimate the gravitational force near the earth surface and the energy of satellites.

    CO-4: Design experiments to find the Young's modulus building materials.

    CO-5: Differentiate between streamlined and turbulent motion of liquids.

    CO-6: Know the properties of surface tension, viscosity and apply it in daily life situation.

UNIT – I: Impulse and Linear momentum – series of collisions – elastic collisions and inelastic collisions in one dimension – collision in two dimension – reactions and decay processes – Angular quantities as vectors – rotation with constant angular acceleration - linear and angular, variables – Kinetic energy of rotation – torque – Newton's second law – Newton's second law for rotation – work, power and the work – Kinetic energy theorem - angular momentum and its conservation. **(10 Lectures)**

UNIT – II : Newton's laws of gravitation and principle of superposition – gravitation near the earth's surface –gravitation inside the earth – gravitational potential energy – planets and satellites – orbits and energy of satellites.

(10 Lectures)

UNIT III: Bending of beams – bending moments – Cantilever: loaded at the free end when the beam weight is ineffective – depression of a beam supported at the ends: loaded cylindrical wire – torsional pendulum – Searle's method for the comparison of young's modulus and coefficient of rigidity modulus – columns, pillars and struts.

(9 Lectures)

UNIT – IV: Streamlines and equation of continuity – Bernoulli's equation: proof and applications – Velocity of efflux of liquid – Toricelli's theorem , Vena contractor, Venturimeter and pitot tube - Properties of Surface tension, Surface Tension by drop weight method and Capillary rise method – Applications.

(10 Lectures)

UNIT V: - Viscosity – Coefficient of viscosity – critical velocity – Reynolds number and its significance – Poiseuille's equation – experimental determination of viscosity : Poiseuille's method, Stokes method, Ostwald's viscometer, Rankine's method for air – Diffusion and osmosis – basic ideas. **(9 Lectures)**

BOOKS FOR STUDY

1. Fundamentals of Physics – VII Edn. David Halliday, Robert Resnick and Krane – Asian Books, New Delhi (1994)
   Unit I : Relevant section of Chapter 10, 11 and 12.
   Unit II : Relevant section of ibid Chapter 15.
2. Elements of properties of matter, - D.S. Mathur, Chapter 10, 11 and 12 and chaper 18. Reprinted in 1984, S. Chand & Co., New Delhi. Relevant section of XII & XIII and related problems.
3. Concept of physics by H.C.Verma, Bharati Bhawan publishers and distributors(2015).

Total 48 hours

B.Sc. PHYSICS – I SEMESTER
18PHYU0102 – Practical – I (0+1)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: To familiarize and make the students acquire knowledge and skills through basic measuring instruments and measurement techniques.

I. Basic Measurement Techniques, Errors of observation, Data Representation and Analysis

1. Vernier calipers & Vernier Microscope
2. Single Optic level & screw gauge
3. Measurement of length / a dimension using
   a. crude estimation
   b. un graduated scale
   c. graduated meter scale
   d. Vernier caliper
   e. Vernier microscope
   f. screw gauge
   g. single optic lever
4. Choice of instrument for measurement.
   a. Random Errors in observation
   b. Due to personal judgment: Period of oscillation of a simple pendulum.
   2. Due to fluctuation in the experimental conditions: resistance measurement at cold water temperature, at a slightly higher and at slightly lower temperature method of reducing random errors.
   c. Systematic Errors in observation due to
      1. Personal judgment : Parallax Error
      2. due to the instrument: Zero Error in meters, screw gauge etc.

   Backlash Error in Vernier microscope.

   3. due to experimental conditions: measurement of resistance at cold water temperature and higher temperature, method of reducing Systematic.
5. Estimation of errors of observation.
   a. in a single measurement
   b. in several measurement of the same quantity
      1. Estimation of standard deviation
      2. Effect of the number of readings on standard deviation.
6. Generation of linear and nonlinear data and graphical representation
a. Extension of a spring
b. Water flowing through a burette or cooling of a hot body.
7. Least square fit, arriving at empirical relations from an examination of the graph.
8. Study of Motion of a compound pendulum.
a. dependence of the period of oscillation on moment of Inertia, amplitude of oscillation, damping (viscous, frictional and electromagnetic)
b. determination of the acceleration due to gravity
9. Surface tension – Interfacial tension.
10. Coefficient of viscosity.

B.Sc. Physics – II Semester
18PHYU0203 – Optics (3 + 0)
(For the batches joining B.Sc., in 2018-2019 and afterwards)

Scope: To acquire knowledge on few basic physics optical phenomena and their corresponding theoretical aspects. Certain measuring techniques involving interference, diffraction and polarization are also imported.

UNIT – I: INTERFEROMETRY: Michelson Interferometer (MI) Circular fringes, and Localized fringes in MI. Applications of Michelson Interferometer – Multiple beam interference – the Fabry – Perot Interferometer, Interference filters and channeled spectra – Lummer–Gehrcke plate; Jamins' Interferometer, Jamins' compensator, Raylegh's refractometer.   **(10 Lectures)**

UNIT – II: DIFFRACTION I: Classification: Fresnel and Fraunhofer; Zone plate; Theory of zone plate, Multiple foci of a zone plate, Comparison of a zone plate and convex lens, Intensity at a point due to a cylindrical wave front – Fresnel diffraction of a cylindrical wavefront at a straight edge; at a narrow obstacle; at a rectangular aperture; at a small circular aperture, Cornu's spiral.   **(10 Lectures)**

UNIT – III: DIFFRACTION II : Comparison of Fraunhofer and Fresnel diffraction; Fraunhofer diffraction at a single slit; mathematical investigation of its intensity distribution; Fraunhofer Diffraction at two slits; Diffraction grating, theory of plane transmission grating, Secondary maxima and minima; Concave reflection grating-Focal curve and elementary theory of concave reflection grating.**(10 Lectures)**

UNIT – IV: RESOLVING POWER OF OPTICAL INSTRUMENTS: Resolving power, Rayleigh's criterion of resolution, Resolving power and magnifying power of a telescope and a microscope; Electron microscope; Phase contrast microscope, Resolving power of a prism, Dispersive power and resolving power of a grating.   **(9 Lectures)**

UNIT – V : POLARIZATION : Birefringence, Nicol prism – its construction and theory – Elliptically and circularly polarized light; Theory ; Quarter and half-wave plates; Production of elliptically and circulary polarized light and their comparison; Fresnel's rhomb; Babinet's compensator; Analysis of elliptically polarized light Interference of polarized light; Double refraction Colours due to thin crystalline plates, Rotatory polarization; Fresnel's explanation; Calculation of the angle of rotation; Specific rotation; Laurent's polarimeter, Half Shade device; Lippich polarimeter, biquartz polarimeter.
                (9 Lectures)

BOOKS FOR STUDY:
1) Fundamentals of Optics – Khanna & Gulati, R. Chand & Co., 14th Edn., New Delhi.
        Unit I : Chapter 13, PP 282-312
        Unit II : Chapter 14, PP 313-315, 321-342.
        Unit III: Chapter 15, PP 353-382, 387-390
        Unit IV: Chapter 16, 400-430
        Unit V: Chapter 18, PP 456-475, Chapter 19, PP 476-487.
2) Textbook of Optics – Subramanyam and Brijlal, Publishers: S. Chand & Co.,

BOOKS FOR REFERENCE:

1. Optics – Ajoy Ghatak, 2nd Edition, Tata McGraw Hill Pub. Cpy. Ltd., New Delhi, 1992.
2. Introduction to Classical and Modern Optiocs-J.R. Meyer Arendt-2nd edition-PHI, 1984.
3. Fundamentals of Physics – V Edn. David Halliday, Robert Resnick and K.S.Krane–john Wiley & Sons New Delhi (2014) Relevant section of Chapter-19

Total 48 hours

Related Online Courses – MOOC

1) https://www.edx.org/course/waves-optics-ricex-phys201x
2) https://www.edx.org/course/optical-materials-devices-mitx-3-15-2x-0

PHYSICS – II SEMESTER
18PHYU0204 – Practical – II (0+1)
(For the batches joining B.Sc., in 2018-2019 and afterwards)

Scope: To expose the measuring skills on the fine apparatus to measure to magnitudes of properties on mechanical and optical areas.

1. Study of depression and deflection of a cantilever
   a. Variation of deflection / depression with distance from fixed end
   b. Young's modulus
2. Young's modulus – Non uniform bending
3. Young's modulus – Uniform bending
4. Young's modulus – Koenig's method
5. Familiarisation with spectrometer – Refractive Index of solid and liquid.
6. Dispersive power of the material of a prism
7. i-d curve
8. i- i' curve and Stoke's formula
9. Radius of curvature – Newton's rings
10. a. Thickness of a wire – Air wedge
    b. Wavelength of light – Biprism

B.Sc. Physics –III Semester
18PHYU0305 – Thermal Physics (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: The fundamental concepts on Thermal Physics is being exposed under various angles

UNIT – I : Kinetic theory of gases: Introduction – Pressure exerted by a gas – Deduction of gas laws on the basis of kinetic theory – Maxwell's law of velocity distribution – Calculation of RMS speed, most probable speed, average speed – Maxwell - Boltzmann law of velocity distribution– Degrees of freedom – Vibratory motion of molecules – Internal energy of a gas– Law of equi-partition of energy – Mean free path– Transport phenomena: viscosity, thermal conductivity and diffusion.   **(9 Lectures)**

UNIT – II : Equation of state for real gases : Van der Waals equation – Critical constants in terms of Van der Waals constants – Reduced equation of states–Law of corresponding states – Joules experiments on inter molecular attraction – Discovery of intermolecular attraction – Porous plug experiment – Linde's process for liquefaction of air– liquefaction of hydrogen – liquefaction of Helium.   **(10 Lectures)**

UNIT – III: First & Second law of thermodynamics: Introduction – Zeroth law of thermodynamics – Work done in a (i) Non-cyclic process; (ii) Cyclic process (iii)Isothermal process (iv)Adiabatic process **(v)** Isobaric process (vi) Isochoric process – Concept of point and path functions – Internal energy –First law of thermodynamics – Relation connecting P,V and T in an adiabatic process – Application of first law of thermodynamics to the specific heat– Second law of thermodynamics: Clausius & Kelvin – Planck statement of the second law – Heat engine – Carnot theorem – Refrigerator   **(11 Lectures)**

UNIT – IV :– Thermodynamic scale of temperature –Applications of Second law of thermodynamics: Clausius-Clapeyron equation –Other thermodynamic work cycles: Rankine cycle – Otto cycle –Diesel cycle – Expressions for their efficiency –Heat engines in actual practice: Steam engine –Otto engine– Diesel engine–Zero point energy   **(8 Lectures)**

UNIT – V : Entropy: Introduction – Definition of entropy – Entropy and adiabatics – Change of entropy in any reversible and irreversible cycle –Expression connecting two laws of thermodynamics – Entropy of a perfect gas – Entropy changes in simple reversible processes –T-S diagram – Thermodynamic functions –Internal energy – Enthalpy – Helmholtz function – Gibbs function – Maxwell's thermodynamic relations – TdS equations – Application–Joule-Kelvin coefficient   **(10 Lectures)**

Total 48 hours

BOOKS FOR STUDY:

1. Heat and Thermodynamics by D.S. Mathur, Sultan Chand & Sons Educational publishers, NewDelhi, Fifth Edition
    Unit I :   Chapter 6 : 207–253
    Unit II : Chapter 7: 268-278; 282-287 ; Chapter11: 429-433
    Unit III : Chapter 8: 305– 315, 316– 323
    Unit IV : Chapter 8: 323–328, 334–357
    Unit V :   Chapter 9: 358–366 & 374–387;Chapter 10: 387–398 & 401–403

BOOK FOR REFERENCES :

1. Heat & Thermodynamics: M.W. Zemansky and R.H. Dittman – International edition.
2. A treatise on heat – Saha and Srivastava, Vth Edition.
3. Thermodynamics, Kinetic theory and Statistical thermodynamics III Edition – Sears and Salinger, Indian student's edition, Narosa Publications, New Delhi.
4. Fundamentals of Physics – VIIth Edn., - David Holliday, Robert Resnick and Krane
5. Heat and thermodynamics by D.S. Mathur, Sultan Chand, 1978.

Related online courses – MOOC courses:

1. https://www.edx.org/course/basics-transport-phenomena-delftx-tp101x-2
2. https://www.edx.org/course/thermodynamics-iitbombayx-me209-1x-1

B.Sc. PHYSICS – III SEMESTER
18PHYU0306 – Practical – III (0+1)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Basic measurement on electricity and advanced measurement on optics areas has been exposed

1. Study of Fraunhofer diffraction at single and double slits.
2. Wavelength of light – Diffraction grating
3. Cauchy's dispersion formula – Cauchy's constants
4. a. Verification of Brewster's law
     b. Study of rotatory power of materials – Laurent's half shade polarimeter.
5. Familarisation with the use of Voltmeter, Ammeter, Multimeter
     Voltage divider and current divider arrangements: series and parallel connections.
6. Verification of Kirchoff's laws and Thevenin's theorem.
7. Measurement of resistance and temperature Coefficient of resistance – Carey Foster's bridge
8. Potentiometer – measurement of low voltage – EMF of Thermocouple, calibration of low range voltmeter
9. Potentiometer – measurement of medium and high voltages – calibration of medium and high range voltmeters
10. Potentiometer – measurement of current, calibration of ammeter.

B.Sc. Physics – III Semester
18CSAU03C1 – Introduction to Computers and Programming in 'C'
(Theory and Practical) (3 + 1)
(For the batches joining B.Sc., in 2018-2019 and afterwards)

Scope: Fundamental language incorporation to the new learners of computer languages is introduced

UNIT I: History and development of computers – need for a programming language – history of programming language
C fundamentals: Introduction to C – Character set – data types – constants – identifiers – keywords – operators and expressions – co0mment – Input and Output functions in C.
(14 Lectures)

UNIT II: Control Statements: while – do .. while …. For if ….else …. Switch – break and continue statements – go to statement. **(12 Lectures)**

UNIT III: Functions: Defining a function – accessing a function – passing arguments to a function – recursion. **(14 Lectures)**

UNIT IV: Array: defining an array – processing an array – single dimensional array – multidimensional array.
Pointers: Pointer declaration – passing pointers to a function – Dynamic storage allocation. **(12 Lectures)**

UNIT V: File handling – open – access modes – close. **(12 Lectures)**

Text Book:

Programming with C, B/S.Gottfried, Schaums outline Series, MC graw – Hill Publishing Company, 1990

Reference Book:

C Programming, E.Balagurusamy, Tata – McGraw Hill publishing, New Delhi

Suggested Practical will be designed by the Department of Computer Science.

B.Sc. Physics – IV Semester
18PHYU0407 – Analog and Digital Electronics (4 + 0)
(For the batches joining B.Sc., in 2018-2019 and afterwards)

Scope: The student will be able to design simple electronic circuits for the laboratory and home with the help of knowledge gained through this course.
Prerequisite: Knowledge of electric circuit analysis, semiconductors

UNIT – I : DEVICES : Transistor structure – action of a transistor – relation between currents in a transistor – sign conventions – transistor as an amplifier – three configurations: CE, CB & CC – transistor characteristics in CE configuration – relation between alpha and beta-comparison between the three configurations, reasons for the choice of CE configuration – basic CE amplifier- FET: construction, working and characteristics - single stage transistor amplifier-graphical method – calculation of gain - hybrid parameters – simplified model-amplifier analysis : Calculation of gain, input and output impedances.   (13 Lectures)

UNIT – II: MULTISTAGE AMPLIFIERS: Gain of a multistage amplifier-decibel-coupling of two stages-RC coupling transformer coupling-frequency response of an RC coupled amplifier-bandwidth of an amplifier FEEDBACK AMPLIFIER: Concept of feedback – types of feedback – voltage gain with feedback – advantages of negative feedback – Oscillators: positive feedback amplifier as an oscillator-Hartley oscillator and Colpit's oscillator (no detailed derivation).   (13 Lectures)

UNIT – III: OPAMP: General features – Virtual ground –inverting amplifier, non-inverting amplifier-voltage follower – summing amplifier –subtractor- integrator and differentiator – solution of simultaneous equations with two unknowns and harmonic oscillator problem.   (13 Lectures)

UNIT – IV: LOGIC CIRCUITS: Universal NAND and NOR gates – combinational logic circuits – half and full adders – half and full subtractors - Boolean laws and theorems – Boolean relation for OR and AND operations – duality theorem – sum of products and product of sum methods – sum of product and product of sum equations – Karnaugh maps – truth table to Karnaugh map – 3 and 4 variable maps – pairs, quads and octets – Karnaugh simplification – overlapping – rolling the map – eliminating redundant graphs – don't care conditions.   (13 Lectures)

UNIT – V: FLIP FLOPS AND COUNTERS: RS flip flops – clocked RS flip flop – D flip flop – edge triggered D flip flop – JK flip flop – JK master slave – Synchronous and asynchronous counters – 3 bit binary ripple counter – 3 bit up-down counter – synchronous counter – mod – 8 parallel binary counter – mod 3 counter – mod 5 counter – mod 10 decade counter – shift counters – 3 stage shift registers – mod 10 shift counter.   (12 Lectures)

Text Books:
1. Bhargava NN, Kulshreshta DC and Gupta SC, Basic electronics and linear circuits, Tata
McGraw Hill (1984),
        Unit I : Chapter 5, page 126-161,168-173, Chapter 8, page 261-278
        Unit II : Chapter 9, 302-320, Chapter 12, page 390-402 and Chapter 13, page 413-424.
2. Jacob Millman, Microelectronics: Digital and Analog Circuits and Systems, McGraw Hill, Singapore (1979).
        Unit III: Chapter 16, page 569 – 573, 577 - 582
3. Donal P Leach. Albert Paul Malvino and Gautam Saha, Digital principles and applications,
   Seventh Edition, Mc Graw Hill, New Delhi (1986).
         Unit IV: Chapter 2, page 48 – 56, Chapter 3, page 74- 101, Chapter 6, page 226 – 228
         Unit V: Chapter 8, page 270 – 286, 288-289, Chapter 10, page 341 - 346, 349 – 356, 360 -367
           (pin number and specific IC pin out details not included)

BOOKS FOR REFERENCE:

1. Digital Electronics, II Edition, W.H. Gothmann PHI, New Delhi (1991)
2. Digital Fundamentals, 3rd Edition, L.Floyd, Universal Book Stall, New Delhi (1998)
3. Digital Integrated Electronics, Herbert Taub and Donald Schilling, McGraw Hill, International Book Company, 11th Edition (1985)

Total 64 hours

B.Sc. Physics –IV Semester
18PHYU0408 – Atomic Physics and Lasers (4 + 0)
(For the batches joining B.Sc., in 2018-2019 and afterwards)

Scope: The development of Physics concepts are introduced in the order of the development of concepts. Also the advanced level optics utilization principles are introduced in the form of lasers.

UNIT – I: Particle properties of waves: Electromagnetic Waves – Black body radiation – Photoelectric Effect – What is Light – Compton Effect. Waves Properties of Particle: De Broglie waves – waves of Probability – The general formula for waves – Phase and group Velocities – Particle Diffraction.
(13 Lectures)

UNIT – II: X-rays: Waves nature of X-rays – Diffraction of X-rays by crystals – Bragg's Law: reflection of X-rays – experimental methods of measuring μ for X-rays; Scattering of X-rays – Polarization of X-rays.
(12 Lectures)

UNIT – III :Atom Models: Alkali Spectra – Space quantization and normal Zeeman effect – Electron spin – vector model of atom – Doublet structure of the alkali spectral lines – Fine structure of the hydrogen spectral terms – Pauli's exclusion principle; periodic classification of elements – Arrangement of electrons in atoms – Energy levels of complex atoms – Anamalous Zeeman effect – Paschen – Back effect - Stern and Gerlach's experiment – Stark effect.
(13 Lectures)

UNIT – IV: Lasers: Introduction – The Fiber Laser – The Ruby Laser – The He-Ne Laser – Optical Resonators – Einstein Coefficients and Optical Amplification – The Line –Shape Function – Typical Parameters for a Ruby laser – Monochromaticity of the Laser Beam
(13 Lectures)

UNIT – V: Fiber Optic communication: Introduction – some historical remarks – Total Internal Reflection – The Optical Fiber – Why Glass Fibers? – The Coherent Bundle – The numerical Aperture – Attenuation in Optical Fibers – Single Mode and Multimode Fibers – Pulse Dispersion in Optical Fibers – Dispersion and Maximum Bit Rates – Waveguide Dispersion – Dispersion Compensating Fibers – Fiber – Optic Sensors.
(13 Lectures)

BOOKS FOR STUDY
01.   Concepts of Modern Physics -Arthur Beiser, Tata McGraw-Hill Publishing Company Limited,Sixth edition.
         Unit I -page number 53-79 and 93-106.
02.   Atomic Physics – J.B.Rajam, S.Chand & Company Ltd.,(2004)
         Unit II - Page Number: 267-304 .
03.   Atomic Physics (Modern Physics) – S.N.Ghoshal, S.Chand & Company Ltd.,(2004)
         Unit III: Page Number: 100-141 .
04.   Optics, Ajoy Ghatak,– (2005) by Tata Mc Graw-Hill, 2nd Edition 2005.
         Unit IV: Chapter 23, Pages 23.3- 23.36.
         Unit V : Chapter 24, Pages 24.3-25.3,
Total 64 hours

B.Sc. Physics – IV Semester
18PHYU0409 – Mathematical Physics (3+0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Basic mathematical tools which re to be utilized in physics problems are introduced.

UNIT – I: Differentiation of vectors – Scalar and vector point functions – gradient, divergence and curl of vector fields – vector integration – line integrals – surface integrals – volume integrals – divergence theorem – Stokes theorem and related problems.   **(10 Lectures)**

UNIT – II: Types of matrices – rank of a matrix – inverse of a matrix – eigenvalues and eigenvectors – diagonalisation – characteristic equation and Cayley Hamilton theorem.   **(9 Lectures)**

UNIT – III: Second order linear homogeneous differential equations – solution by power series method Partial differential equation – important partial differential equations in Physics relevant problems – solutions by the separation of variables.   **(10 Lectures)**

UNIT – IV: Special functions: Bessel functions: generating functions – recurrence relations - Legendre differential equation – Power series solution – Legendre polynomials – generating functions – recurrence relations.   **(10 Lectures)**

UNIT – V: Beta – Gamma functions, Fourier series and Fourier transforms and applications.

                                                                                                                (9 Lectures)

BOOK FOR STUDY:
1.   Mathematical Physics, H.K.Dass, Fourth revised edition 2003.
         Unit I   : Pages 336-389
         Unit II   : Pages 196 - 199, 250 – 259 and PP 271 - 277,
         Unit III   : Pages 601 – 604, and 637-664,
         Unit IV   : Pages 548-551, 562 – 573, 581 - 594
         Unit V   : Pages 778 – 782, 861 – 874, 1086 - 1101

BOOKS FOR REFERENCE:
         1. Introduction to Mathematical Physics – Charley Harper – PHI India.
         2. Mathematical Physics – P.K. Chattopadhyoy – Wiley Eastern Ltd.,
         3. Advanced engineering Mathematics – Erwin Kreyzik – Wiley Ltd.

                                                                                                Total 48 hours

B.Sc. Physics – IV SEMESTER
18PHYU0410 – Practical – IV (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Instruments in sophistication measurements in electricity, thermal physics are introduced

1. Measurement of temperature using various principles expansion of solids, liquids and gases, resistance thermocouple-Selection of thermometer for different purposes.
2. Measurement of heat energy-method of mixtures-Specific heat capacity of solids, liquids – Latent heat of fusion of ice and latent heat of vaporization of water – Barton's correction.
3. Cooling curve for wax / naphthalene – Melting point.
4. Measurement of heat energy – Electrical method – specific heat capacity of solids and liquids-Barton's correction.
5. Study and Measurement of Calorific value of fuels, - Bomb Calorimeter
6. Thermal conductivity of a good conductor – Lee's Disc method
7. Thermal conductivity of a good conductor – Forbe's method
8. Verification of Stefan's law.
9. Figure of merit of a Table galvanometer
10. Conversion of a galvanometer into an ammeter and voltmeter and their calibration.
11. Figure of merit of a suspended coil galvanometer
12. Suspended coil Galvanometer –
    1. Measurement of low voltage – emf of Thermocouple.
    2. Measurement of current – conversion into milli voltmeter
    3. Measurement of resistance
13. Ballistic galvanometer
    1. Figure merit and measurement of charge
    2. Capacitance of a capacitor
    3. Self inductance of a coil
    4. Mutual inductance between a pair of coils
    5. High resistance by leakage
    6. Measurement of current and resistance
14. Measurement of time constants of circuits – LR, CR

B.Sc. Physics –IV Semester
18PHYU04E1 – (Major Elective-I) / (18PHYU04N1 Non Major Elective-I)
Solar Thermal and Renewable Energy Systems (3+ 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Various forms of solar energy utilization concepts have been introduced

UNIT – I : Solar Radiation and its Measurement – Solar constant – Solar Radiation at the Earth's surface, Solar Radiation Geometry – Measurements and Data. Estimation of average Solar Radiation and Solar radiation on tilted surfaces. **(9 Lectures)**

UNIT – II : Solar Energy Collectors: Physics principles of the conversion of solar radiation into heat – Flat Plate Collector (FPC) – Performance analysis of FPC – concentrating collector (CC) – advantages and disadvantages of CC over FPC – selective coatings, photo voltaic cell. Application of Solar Energy : Solar water heating – space heating – space cooling – solar electric power generation – agricultural and industrial process heat – Solar distillation – solar pumping – solar furnace – solar cooking. **(10 Lectures)**

UNIT – III : Wind energy: Basic principles of wind energy conversion: Nature of the wind – the power in the wind – forces on the blades and thrust on turbines – wind energy conversion (WEC) – basic components of wind energy conversion – classification of types of WEC systems – advantages and disadvantages of WECs. **(9 Lectures)**

UNIT – IV : Biomass: Introduction – biomass conversion technologies – photosynthesis – biogas generation – factors affecting bio digestion on generation of gas   - classification and types of biogas plants – advantages and disadvantages of floating drum plant and fixed dome type plant.   **(10 Lectures)**

UNIT – V : Geothermal and OTEC : Introduction – nature of geothermal fields – geothermal sources – hydrothermal (convective resources) – basic ideas of vapor dominated systems – liquid dominated systems – advantages and disadvantages of geothermal energy over other energy forms – applications of geothermal energy, OTEC : Introduction – Basic ideas of OTEC – methods of OTEC power generation – Open cycle and closed cycle system. **(10 Lectures)**

BOOKS FOR STUDY:
1. Non-Conventional energy sources – G.D. Rai, Khanna Publishers – Fourth edition (1997)

BOOKS FOR REFERENCE:
1. Solar energy principles of thermal collection and storage – S.P. Sukhatme, TMC – 1984
2. Renewable energy sources and conversion technology – N.K. Bansal, M. Kleemann and M. Melinn
3. Solar Energy Hand Book – John F. Kreider and F. Kreith, McGraw Hill Book Company, (1981)

Total 48 hours

B.Sc. Physics –IV Semester
18PHYU04E2 – (Major Elective-I) Introduction to Astrophysics (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: The overall introduction to Astrophysics area has been exposed**.**

UNIT I: Astronomical Instruments: Light and its Properties-The Earth's Atmosphere and the Electromagnetic Radiation-Optical Telescopes-Radio Telescopes-The Hubble Space Telescope(HST)-Astronomical Spectrographs-Photographic Photometry-Photoelectric Photometry-Spectrophotometry-Detectors and Image Processing.   **(8 Lectures)**

UNIT II: Distances of stars: Stellar Magnitude Sequence-Absolute Magnitude and the Distance Modulus-The Bolometric Magnitude-Different Magnitude Standards: The UBV system and six-colour Photometry-Radiometric Magnitudes-The colour-index of a star-Luminosities of Stars-Stellar Parallax (Trignometric) and the Units of Stellar Distances-Stellar Positions: The Celestial Coordinates-Stellar Motions-The Solar Motion and the Peculiar Velocities of Stars-The Velocity Dispersion-Statistical Parallax-Moving Cluster Parallax.   **(10 Lectures)**

UNIT III: Radio Galaxies: Techniques of Identification of Radio Objects-Structures of Radio Galaxies-Classification of Radio Galaxies and Their Typical Characteristics-Energy Processes in Radio Galaxies-Radio Galaxies in Evolutionary Sequence-Some Important Radio Galaxies-Seyfert Galaxies Quasars:The Discovery-Radio Properties-Optical Properties-The Red Shift of Quasars-Active Galactic Nuclei.
                                   (10 Lectures)

UNIT IV: Milky way Galaxy: Rotation of the Galaxy: Differential Rotation-Determination of the
Rotation Parameters in the Solar Neighborhood-Radio Observation of the Galaxy at 21-cm Wave Length-The Rotation Curve of the Galaxy: The General Rotation Law-Density Distribution of Gas and Spiral Structure of the Galaxy: Radio and Optical Data-The General Structure of the Galaxy-The Mass of the Galaxy-Magnetic Field in the Galaxy-Cosmic Rays-Continuous Radio Emission in the Galaxy.   **(10 Lectures)**

UNIT V: Cosmology: Redshift and the Expansion of the Universe -Matter Density in the Universe and the Deceleration Parameter - The Cosmological Principle - Fundamental Equations of Cosmology - The Current Theories: Some Important Models of the Universe-Observational Tests of Cosmological Models - The Cosmic Microwave Background Radiation.   **(8 Lectures)**

BOOKS FOR STUDY:
An Introduction to AstroPhysics - Baidyanath Basu,Tanuka Chattopadhyay,sudhindra Nath Biswas, Second Edition(2010), PHI Learning Private Limited.

     Unit I   : Chapter 1 Pages 1to26
     Unit II   : Chapter 3 Pages 56 to 76
     Unit III   : Chapter 19 & 20 Pages 506 to 535
     Unit IV   : Chapter 16 Pages 390 to 426
     Unit V   : Chapter 21 Pages 536 to 565

BOOKS FOR REFERENCE

1. A beginner's guide to the universe - Chaisson, E. and McMillan, S., 1998. Astronomy:. Prentice Hall.

2. Fundamental astronomy - Karttunen, H., Kröger, P., Oja, H., Poutanen, M. and Donner, K.J. eds., 2016. . Springer.

3. Astrophysics: stars and galaxies - Abhyankar, Krishna Damodar. Universities Press, 2002.

4. Mathematical cosmology and extragalactic astronomy. Segal, Irving Ezra.Vol. 68. Academic Press, 1976.

5. James Binney – Astrophysics a very short introduction – Oxford university press

6. Extragalacic astronomy and Cosmology – An introduction . Peter Schneider , Springer

7. An introduction to modern astrophysics.Carroll, Bradley W., and Dale A. Ostlie. Cambridge University Press, 2017.

8. Cosmology ,Weinberg, Steven.. Oxford University Press, 2008.

9. Aspects of astronomy. Culver, R. B. (1998). Fort Worth: Harcourt Brace Custom.

10. Astronomy: A physical perspective. Kutner, M.L., 2003.Cambridge University Press.

11. Astrophysics of the Solar System, K.D. Abhyankar. 1999, University press

12. Introductory Astronomy & Astrophysics. Zeilik, Michael. 1998 Brooks/Cole / Thomson Learning,

13. Vedic Astronomy Hole, P. V.. Nagpur: Shri Babasaheb Apte Smarak Samitee, 1990.

14. New horizons in astronomy . Brandt, J. C., & Maran, S. P. (1979).. San Francisco: Freeman.

15. Astronomy by R.B.Culver, Barnes and Noble books 1979.

16. Discovery of Astronomy- Robert D.Chapman, W.H.Freeman and Co,(1978).

B.Sc. Physics –IV Semester
18PHYU04E3 (Major Elective-I) Waves and Oscillations (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Objectives:

To impart knowledge about waves and oscillations and sound.
To make them to understand the principles and methods of finding the properties.

Specific Learning outcomes: At the end of the course the student should be able to

CO-1 Understand the concept of SHM

CO-2 Explain the free forced and damped vibration

CO-3 Acquire the knowledge of wave motion

CO-4 Know the properties of sound

CO-5 Apply the knowledge to ultrasonic services

UNIT I: Simple Harmonic Motion, Characteristics of S.H.M., Differential equation of S.H.M., K.E., P.E. and Total Energy of a vibrating particle, Energy of Vibration, Oscillations with one degree of freedom, Linearity and superposition principle, Simple pendulum, Compound pendulum, Bar pendulum, LC Circuit, Lissajous figures, Composition of two SHM(s) of frequency ratio 2:1, Experimental methods for obtaining Lissajous figures, Uses of Lissajous figures   **(10 Lectures)**

UNIT II: Free, Forced and Resonant Vibrations: Free Vibrations, Undamped Vibrations, Damped Vibrations, Damped S.H.M. in an electrical circuit, Forced Vibrations, Resonance and Sharpness of Resonance, Phase of Resonance, Quality Factor, Examples of Forced and Resonant Vibrations.

(9 Lectures)

UNIT III: Wave motion, Characteristics of wave motion, Transverse wave, motion, Longitudinal wave motion, Differential equation of wave motion, Particle velocity, Wave velocity, Principle of superposition, Interference of Sound waves, Quicke's tube Seebeck's tube, Beats, Decibel, Doppler effect, Applications.   **(10 Lectures)**

UNIT IV: Reflection of Sound, Reflection of a plane wave at plane surface, Experimental determination of reflection of sound, Whispering Galleries, Echo, Applications, Refraction of plane wavefront at plane surface, Experimental demonstration of refraction of sound, Diffraction of sound, Fresnets Assumptions, Intensity of sound at a point due to plane wavefront, Dopper effect, Applications.   **(9 Lectures)**

UNIT V: Ultrasonics, Production of ultrasonics by magnetostriction and piezoelectric methods, detection of ultrasonic waves, Acoustic grating, Applications of ultrasonic waves.   **(10 Lectures)**

Books for Study

1. Brijlal & Subramanyam "Waves & Oscillations", S.Chand & Co., 1974,
     Unit I : Pages: 1-30, 37-38, 45, 56-63
     Unit II   : Pages : 65-83
     Unit III   : Pages :82-88, 92-93, 135-141, 211 to 220)
     Unit IV   : Pages :192-198, 202-209
     Unit V   : Pages : 282-293

 Reference Books:

1. Sound, M.Narayanamurti, N.Gosakan and T.Rajagopalan, The National Publishing Co, Madras,
    First Edition, 1978.

2. A Textbook of Sound with Theory of Oscillation and Waves, D.R.Khanna and R.S.Bedi, Atma Ram & Sons, Delhi, 1984

Total 48 hours

B.Sc. Physics –IV Semester
18PHYU04N2 (Non Major Elective-I) Physics of Sports (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Applications of Physics concepts on various sports phenomena are introduced

UNIT – I : INTRODUCTION: Distribution of mass in Human body – forces in muscles and bones – elastic properties – work, energy and power of the body – sizes – strength and food requirements – calculation of calorific content needed for each sports person.   **(9 Lectures)**

UNIT – II : RUNNING AND JUMPING : Basic ideas about distance – velocity and speed –acceleration, acceleration due to gravity – angular distance , speed and angular acceleration. Analysis Of Track Techniques: Starting, running , hurdling, stride length, frequency, sprint length, frequency and sprint start. Analysis Of Field Techniques: Standing broad jump, running broad jump, pole vault-techniques involved-guiding principles–(video demonstration of track and field events and the techniques).
                                                                                                              (9 Lectures)

UNIT – III : BATS AND BALLS LINEAR KINETIC : Inertia-mass –force-momentum – Newton's laws of motion – friction – impulse – impact – oblique impact – elasticity – impact on fixed surface, moving bodies. Analysis Of Cricket / Base Ball: Impact – moment of inertia – spin – size of the ball-size of the bat – batting – stride – swing – bunting. Analysis Of Tennis Techniques: Grip- striking – serve – direction of flight of ball – guiding principles (video demonstrations of the above events).   **(10 Lectures)**

UNIT – IV: DIFFERENT PROJECTILES IN SPORTS: Projectiles – horizontal and vertical motion- range of projectile – trajectory – Analysis of throwing events: techniques involved in speed of release, angle of release and reverse in shot-put, discus, javelin and hammer throw-analysis of broad jump-basket ball shooting and foot ball kicking (video demonstration of projectiles in sports) – guiding principles – analysis of basket ball techniques : Dribbling and passing .   **(10 Lectures)**

UNIT – V: THE GYMNASTICS AND ADVENTURE SPORTS : Eccentric force-moment – equilibrium – centre of gravity – weight – rotator and circular motion – Analysis of Gymnastics activities: Techniques of lift-rotation-take off – landing for long horse vault, parallel bar etc., - Analysis of rope climb , tight rope walking , skipping – car race, boat race, cycle race – guiding principles (video demonstration). Swimming And Diving: Basic ideas of flotation – buoyant force – centre of buoyancy – specific gravity - relative motion – fluid resistance – conservation of momentum – Analysis of swimming techniques – starting – racing – turn different strokes – diving techniques (video demonstration) Other Factors Influencing Performance: Air resistance – spin or gyration – available force – human characteristics – effects of gyroscopic action – guiding principles.   **(10 Lectures)**

BOOKS FOR STUDY

1. The Biomechanics of Sports Techniques, Third edition, Hay.G.James – Relevant portion of chapters 3 to 10 & 12, 13 to 17.
2. Scientific Principles of Coaching, Second Edition – Relevant portion of chapters 5, 7 to 14, 16 to 18.
3. General Physics with Bioscience Essays, Marion and Nornyak, Second Edition– Chapters 1.2, 2.5, 2.8, 3.4, 4.2, 5.3, 7.3.

                                                                                                              Total 48 hours

B.Sc. Physics –IV Semester
18PHYU04N3 (Non Major Elective-I) Physics of Music (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Applications of Physics concepts on various musical phenomena are introduced

UNIT – I: BASIC IDEAS OF SOUND: Wave motion – types of waves-simple Harmonic motion – Properties of sound waves – reflection, refraction, diffraction and interference of sound velocity of sound-standing waves-Beats-Resonance. **(9 Lectures)**

UNIT – II : BASIC IDEA OF MUSIC : The ear-pitch loudness and quality of musical notes-just noticeable difference in pitch-barrel hearing-aural or combination tones-subjective tones-subjective music-vibrato and tremolo-pitch range of musical instruments-quality – Fourier's theorem-musical scales and frequency ratios-choosing a musical scale, Carnatic, Hindustani and Western systems. **(10 Lectures)**

UNIT – III: MUSICAL INSTRUMENTS : String instruments-frequency of stretched strings-longitudinal vibration in strings-plucked, bowed and struck stringed instruments-one example for each from Carnatic Hindustani and western. Wind Instruments modes of oscillation in open and closed pipes-Different types of wind instruments-examples from Carnatic and western. Vibrations in Stretched Membranes and Plates. Drums, cymbals etc. **(10 Lectures)**

UNIT – IV: ELECTRONICS OF MUSIC Microphones (carbon & crystal) – pickup – Loud speaker, Amplifiers. Addition of sound -santoors. **(9 Lectures)**

UNIT – V: ELECTRONIC SYSTEMS: Tape recording and play back equalizers, Recording and reproduction of sound in cine films. Acoustic of Buildings: Aoustics-Reverberation and Reverberation time – Acoustic measurements: Acoustic intensity level – Acoustic pressure level-Factors affecting the acoustics of buildings – sound distribution in an Auditorium – Requisites for good acoustics. **(10 Lectures)**

BOOKS FOR STUDY:

1. Physics of Musical sounds – Askill.J
2. Physics for you - Johnson. K
3. Waves - Berkely
4. Sound and Ultra sound - Freeman I.M.
5. Home Science Physics - Renganayakiamma
6. Musical Instruments of India - Krishnasami. S
7. Text book of Sound - Brijlal and Subramanyam
8. Instrumentation and Analysis – Nakra and Choudry.

Total 48 hours

B.Sc. Physics –V Semester
18PHYU0511 – Electromagnetics (4 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: To give an insight on the concept of field and a thorough understanding of Mathematical tools and methods involving in electric and magnetic fields.

UNIT – I: Electrostatic fields in vacuum: Electric field outside and inside macroscopic bodies, Gauss's law, the average potential over a spherical surface, Poisson and Laplace equations, conductors, calculation of electric field produced by a simple charge distribution, Field due to a uniform spherical charge distribution – Calculation of electric field inside and outside the charges, Coulombs law – Electric dipole, potential energy of a charge distribution, energy density in an electric field.   **(13 Lectures)**

UNIT – II : Electrostatic fields in dielectric medium : Electric polarization, electric field at an exterior point, bound charge densities of surface and volume charge distribution, polarization current density, electric field at an interior point, electric field intensities due to distant and near dipoles, the local field electric susceptibility, divergence of electric field intensity and electric displacement, relative permittivity and Poisson's equation for dielectrics, free and bound charge densities, calculation of electric field involving dielectrics, dielectric insulated parallel plate capacitor, free charge density, bound charge density and electric displacement at a dielectric conductor boundary, dielectric sphere with a point charge at its centre.   **(13 Lectures)**

UNIT – III : Steady currents and nonmagnetic materials: Magnetic forces, magnetic induction B, Biot-Savart law – magnetic induction due to a current flowing in a long straight wire, forces between two long parallel wires, circular loop. The force on a point charge moving in a magnetic field – Hall effect in semiconductors, divergence of the magnetic induction, vector potential – long straight wire, pair of long parallel wires curl of the magnetic induction, ampere's circuital law-long cylindrical conductor, long solenoid , short solenoid.   **(13 Lectures)**

UNIT – IV : Magnetic Induction and magnetic energy: Faraday's law of induction – expanding loop. Faraday induction law – differential form – Induced electric field intensity in terms of vector potential – electromotance induced in a loop by a pair of long parallel wires carrying a variable current, induced electromotance in a moving system- electromotance induced in a fixed loop in a time dependent magnetic field, electromotance induced in a loop rotating in a fixed magnetic field inductance and electromotance, mutual inductance, self inductance of a long solenoid, mutual inductance between two coaxial solenoids, coefficient of coupling.   **(13 Lectures)**

UNIT – V: Maxwells equations: Differential form – Integral form – Duality-Lorentz"s Lemma - Non-homogeneous equations for E and B.   **(12 Lectures)**

BOOK FOR STUDY :
Electromagnetic fields and Waves – Paul Lorrain and Dale Corson, II Edn. CBS Publishers and Distributors (1986),
Unit 1. Pages 40-81
Unit 2. Pages 91-115
Unit 3   Pages 292 – 323
Unit 4. Pages 332 - 364
Unit 5 : Pages 439 to 450

BOOKS FOR REFERENCE:

1. Electromagnetic waves and Radiating systems, II Edn. Edward C. Jordon & Keith G.. Balmain, Prentice Hall of India Pvt. Ltd., New Delhi (1993).
2. The Feynman Lectures on Physics, Vol.2 Feynman, Leighton and Sands Narosa Publishing House, 1964, Reprint (1993).

Total 64 hours

Related Online Courses - MOOC
1) https://www.edx.org/course/dian-ci-xue-electromagnetism-tsinghuax-uphys3x
2) https://www.edx.org/course/electricity-and-magnetism-magnetic-fields-and-forces
3) https://www.edx.org/course/electricity-and-magnetism-electrostatics
4) https://www.edx.org/course/preparing-ap-physics-c-electricity-georgetownx-phyx152x-1
5) https://www.edx.org/course/apr-physics-2-part-2-electricity-ricex-advphy2-2x-0

B.Sc Physics – V semester

18PHYU0512- Nuclear and Particle Physics (3+0)

(For the batches joining B.Sc in 2018-2019 and afterwards)

Unit-I: THE CONSTITUENTS OF NUCLEUS AND SOME OF THEIR PROPERTIES: Introduction-Rutherford scattering an estimation of the nucleus size- measurement of nuclear radius- constituents of the nucleus and their properties- discovery of neutrons- nuclear spin, moments and statistics- Alpha decay, Beta decay and Gamma decay (Qualitative explanation only)

Unit-II: RADIOACTIVITY: Introduction- properties of radioactive rays - The law of radioactive decay - unit of activity - Radioactive growth and decay - ideal equilibrium, transient equilibrium and secular equilibrium - radioactive series-radioactive isotopes of lighter elements - Artificial radioactivity - determination of the age of the earth - carbon dating-archaeological time scale - illustrative examples.

Unit-III: PARTICLE ACCELERATORS, NUCLEAR REACTIONS, NUCLEAR MODELS AND REACTORS

PARTICLE ACCELERATORS:

 Low energy cyclic accelerators: cyclotron (fixed frequency)- variable energy cyclotron- betatron- linear accelerator(electron linear accelerators only)– synchrotron(synchro cyclotron only)

NUCLEAR REACTIONS:

 Types of nuclear reactions- conservation laws- nuclear reaction kinematics- nuclear transmutations: transmutation of alpha particles, transmutation of protons, transmutation of neutrons- nuclear fission & fusion- atom bomb and hydrogen bomb.

NUCLEAR MODELS AND REACTORS:

 Nuclear models: liquid drop model and shell model only - nuclear reactors - general design of a nuclear reactors(basic reactors) swimming fool reactor, fast breeder reactor - chain reactions-fissile materials.

Unit-IV: DETECTION AND MEASUREMENTS OF NUCLEAR RADIATIONS**:** Introduction-ionization chamber-Geiger Muller counter- scintillation counter- cloud chamber-bubble chamber-nuclear emulsions.

Unit-V: COSMIC RAYS AND ELEMENTARY PARTICLES:

COSMIC RAYS**:**

 Introduction- secondary cosmic rays- geomagnetic effects: effects of sea level and low altitudes- effects at high altitudes- interpretation of geomagnetic effects- absorption of cosmic rays- energy of mass measurements of secondary cosmic rays- showers- Cosmic ray primaries-Origin of cosmic rays

ELEMENTARY PARTICLES:

Introduction - classification of elementary particles - fundamental interactions: Gravitational interaction - electromagnetic interaction - weak interaction - strong interaction; conservation laws: conservation of linear momentum, conservation of angular momentum, conservation of energy, conservation of charge, conservation of lepton number, conservation of baryon number, conservation of isospins, conservation of strangeness, conservation of hypercharge, conservation of charge conjugation, conservation of parity-properties of elementary particles (basic properties only): electron ,positron and positronium - proton and antiproton - neutron and antineutron – neutrino and antineutrino, mesons - K-mesons-quarks.

Books for study:

1. Nuclear Physics An Introduction by S.B.Patel (New age international (P) Ltd publishers- New Delhi-(2nd Edition)).

   Unit I : Pages 112-132

   Unit II : Pages 57-66,70-87

2. Nuclear physics by D.C. Dhayal (Himalaya Publishing House-Fifth revised & enlarged edition

   Unit III: Pages 482-491,501-505, 401-408, 358-360, 360-362, 578-579, 585, 592-594, 626-628, 633-636, 638, 649
   Unit IV: 129-133,143-148,148-152,156-159,159-162,165-168
   Unit V : 674-683,686-688,690-691, 692-705,707-712,713-714,725,745

B.Sc. Physics –V Semester
18PHYU0513 – Classical Mechanics & Relativity (4 + 0)
(For the batches joining B.Sc., in 2018-2019 and afterwards)

Scope: Physics of massed particles movement are introduced

UNIT – I : LAGRANGIAN DYNAMICS: Introduction – basic concepts – constraints: Holonomic constraint – Nonholonomic constraint – some more examples of holonomic and nonholonomic constraints – force of constraints – difficulties introduced by the constraints and their removal – Generalized coordinates – principle of Virtual work – D'Alembert's principle – Lagrange's equations from D'Alembert's principle – procedure for formation of Lagrange's equation – Lagrange's equations in presence of Non-conservative forces – Generalized potential – Lagrangian for a charged particle moving in an electromagnetic field (Gyroscopic forces) – Hamiltonian's principle and Lagrange's equations.
(12 Lectures)

UNIT – II : VARIATIONAL PRINCIPLES: Introduction – the calculus of variations and Euler-Lagrange's equations – deduction of Hamiltonian's principle from D'Alembert's principle – modified Hamiltonian's principle – deduction of Hamiltonian's equations from modified Hamiltonian's principle(or variational principle) – deduction of Lagrange's equations from variational principle for non-conservative systems (Holonomic constraints).
(12 Lectures)

UNIT – III : TWO BODY CENTRAL FORCE PROBLEM: Reduction of two-body central force problem to the equivalent one-body problem – central force and motion in a plane – equations of motion under central force and first integrals – differential equation for an orbit - inverse square law of force – Kepler's law of plantery motion and their deduction: deduction of the Kepler's first law – deduction of the Kepler's second law – deduction of the Kepler's third law(period of motion in an elliptical orbit) – stability and closure of orbit under central force – artificial satellites – Virial theorem. **(12 Lectures)**

UNIT – IV: NONINERTIAL AND ROTATING COORDINATE SYSTEMS: Non-inertial frames of reference – fictitious or Pseudo force – centrifugal force – uniformly rotating frames – free fall of a body on Earth's surface – Foucault's pendulum.
(14 Lectures)

UNIT – V: SPECIAL THEORY OF RELATIVITY – LORENTZ TRANSFORMATION: Introduction – Galilean transformation – principle of relativity – transformation of force from one inertial system to another - covariance of the physical laws – principle of relativity and speed of light – the Michelson-Morley experiments – Ether hypothesis – postulates of special theory of relativity -Lorentz transformation – consequence of Lorentz transformations: length contraction – simultaneity – time dilation – addition of velocities.
(14 Lectures)

BOOKS FOR STUDY :

      Classical Mechanics by J.C.UPADHAYA Himalaya Publishing House second revised edition.
      Unit- I : Page no 27-53.
      Unit– II : Page no 138-149.
      Unit- III: Page no 103-125.
      Unit- IV: Page no 320-329.
      Unit- V : Page no 334-353.

Books for References:
1. Classical Mechanics-H. Goldstein – II Edition, Narosa Publishing House, New Delhi – 1995
2. Mechanics – Schaum's series : Third Edition Chapter VII P

Total 64 hours

B.Sc. Physics- V SEMESTER
18PHYU0514 – Practical – V (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Hands on training on sophisticated and ordinary instruments operation and their uses have been exposed

1. Study of CRO and its uses and study of Function generator.Testing of diodes, transistors.
2. Factors affecting induced emf in a coil and factors that determine the secondary emf & current in coupled coils – CRO
3. AC circuits – phase lead, phase lag and impedance
4. Measurement of inductance and capacitance – AC Bridges Maxwell and Owen.
5. Simple wiring
6. Study of Hysteresis of magnetic material
7. LCR circuits – series and parallel resonance – sharpness resonance and Q factor.
8. Study of motors
9. Maintenance, reassembling and Servicing of
   a. Balances
   b. Telescopes
   c. Microscopes
   d. Rheostats
   e. Galvanometers, Ammeters & Voltmeters
10. Hands on training in using simple tools
11. Voltage multipliers-diodes, Characteristic of a Transistor CE-mode-measurement of h parameters-load line
12. FET characteristics – measurement of parameters and load line
13. Design and study of a power supply with filter circuit
14. Design and study of a regulated power supply.
15. Design and study of a single stage voltage amplifier – BJT & FET.
16. Design and study of Hartley and Colpitt's oscillators
17. Study of Transducers.

B.Sc. Physics –V Semester
18PHYU05E4 – (Major Elective-II) Instrumentation (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Measuring instruments in mechanical. Electrical and electronics category and their working principles are introduced

Unit I: Basics of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. Electronic Voltmeter:Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter**,** specifications and their significance. **(10 Lectures)**

Unit II: Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT,Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.
(10 Lectures)

Unit III: Signal Generators and Analysis Instruments: Block diagram, explanation andspecifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis. **(8Lectures)**

Unit IV: Impedance Bridges & Q-Meters: Block diagram of bridge. working principles of basic(balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges. **(10 Lectures)**

Unit V: Digital Instruments: Principle and working of digital meters. Comparison of analog &digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. Digital MultimeterBlock diagram and working of a digital multimeter. Workingprinciple of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution. **(10 Lectures)**

Reference Books:
- A text book in Electrical Technology - B L Theraja - S Chand and Co.
- Performance and design of AC machines - M G Say ELBS Edn.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Logic circuit design, Shimon P. Vingron, 2012, Springer.
- Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
- Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
- Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk, 2008, Springer
- Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

Total 48 hours

B.Sc. Physics – V Semester

18PHYU05E5 – (Major Elective-II) Television Transmission & receiver (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Academic and practical knowledge on TV functioning and its servicing skill are incorporated.

UNIT – I: Elements of a Television System : Picture transmission – sound transmission – picture reception – sound reception – picture synchronization – Basic monochrome transmitter and receiver – gross structure, image continuity, number of scanning lines, flicker, fine structure, total gradation – composite video signal – horizontal synchronization details – vertical synchronization details – function of vertical pulse train . **(8 Lectures)**

UNIT – II: Signal Transmission: AM: Channel band – vestigial side band transmission – transmission efficiency – complete channel band width – reception of vestigial side band signals - demerits of vestigial side band transmission –FM: FM Channel band width –channel band width for colour transmission – Television signal stands – monochrome picture tube – beam deflection screen phosphor-face plate-picture tube characteristics – picture tube circuit controls. **(10 Lectures)**

UNIT – III: **Camera principle** – photoelectric effect – image storage principle – electron scanning beam – video signal electron multiplier – image orthicon – Videocon – plumb icon – CCD.
TV receiver- Block diagram-antenna-RF section – IF section – vestigial side band correction – choice of IF – sound separation – sound section – sync processing – vertical deflection – EHT supply. **(10 lectures)**

UNIT – IV : **Colour Television** : Compatibility – natural light – colour perception – three colour theory – luminance, Hue and saturation – colour TV camera – luminance signal – production of colour difference voltage – compatibility considerations – Delta gun picture tube – purity and convergence PIL colour picture tube pin cushion correction- Auto Degaussing circuit – grey scale tracking. **(10 lectures)**

UNIT – V: **Television applications**: Cable television MATV & CATV – closed circuit (CCTV) theatre television – Video tape recording play back – Television via satellite.
Fault finding: Trouble shooting in monochrome receivers. **(10 lectures)**

BOOKS FOR STUDY:

1. Monochrome and Colour Television 22nd Reprint R.R. Gulati, Wiley Eastern (1993).
   (Page 5-48, 50-81, 82-96, 131-148, 540 – 555, 558-568, 576-580, 184-203 and 722-723).

Total 48 hours

B.Sc. Physics – V Semester

18PHYU05E6 – (Major Elective-II) Microprocessor 8085 Programming (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Microprocessor Architecture and Program construction, operation through Assembly language are Provided.

UNIT–I: MICROPROCESSOR ARCHITECTURE & MICROCOMPUTER SYSTEM AND INTRODUCTION TO 8085 ASSEMBLY LANGUAGE PROGRAMMING: Microprocessor architecture and its operations – Microprocessor initiated operations and 8085 bus organization – Internal data operations and the 8085 registers –Peripheral or externally initiated operations –Memory – Flip-Flop as a storage element – Memory map and Address – Memory Address of a 1K Memory chip –8085 Programming model – Instructions classification – Instructions and data format – Executing a simple program – Over view of the 8085 instruction set.   **(12 Lectures)**

UNIT–II: INTRODUCTION TO 8085 INSTRUCTIONS: Data transfer operations – Arithmetic operations – Logic operations–Branch operations–Writing assembly language programs–
Debugging a program.
(10Lectures)

UNIT – III : PROGRAMMING TECHNIQUES WITH ADDITIONAL INSTRUCTIONS: Programming techniques – looping – counting and indexing – Additional data transfer and 16 bit arithmetic instructions –Arithmetic operations related to memory – Logic operations – Rotate – Compare – Dynamic debugging.
                                                                                          (10 Lectures)

UNIT – IV : COUNTERS AND TIME DELAYS : Counters and Time delays – Hexadecimal counter – Zero to Nine counter – Generating pulse waveforms – Debugging counter and time delay programs.
STACK AND SUBROUTINES: Stack – Subroutine – Traffic signal controller –Restart, conditional call and return instructions – Advanced subroutine concepts.   **(8 Lectures)**

UNIT – V : GENERAL PURPOSE PROGRAMMABLE PERIPHERAL DEVICES: The 8255A Programmable Peripheral Interface – Interfacing Keyboard and Seven Segment Display.   **(8 Lectures)**

BOOKS FOR STUDY:

1. Microprocessor Architecture, Programming and Applications with the 8085– R.S. Gaonkar,
   Wiley Eastern, Fourth edition, New Delhi.

   Unit I   : Chapter 2 Pages: 25–63 and Chapter 5 Pages 139–159
   Unit II : Chapter 6 Pages: 161–211
   Unit III : Chapter 7 Pages: 213–260
   Unit IV   : Chapter 7 Pages: 213–260
   Unit V : Chapter 15 Pages: 445–471

BOOKS FOR REFERENCE:

1. Introduction to microprocessors- II – A.P. Mathur (1988) Edn., TMH, New Delhi.
2. 8080A / 8085 assembly language programming – L.A. Leventhal
3. 8080A / 8085 assembly language subroutines – L.A.Leventhal and W. Saville.

Related online courses – MOOC courses:

1. https://www.edx.org/course/embedded-systems-shape-the-world-microcontroller-inputoutput
2. https://www.edx.org/course/embedded-systems-shape-the-world-multi-threaded-interfacing

B.Sc. Physics – V Semester
18PHYU05S1– (Skill Based Course) / 18PHYU05N4 – (Non Major Elective-II) /
Instruments and Servicing (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Laboratory instruments and gadgets principle and operations and troubleshooting instruments are introduced.

UNIT – I : GENERAL IDEAS: DC power supply : fault finding and servicing – characterization of a power supply-use of measuring instruments; voltmeter, ammeter and ohm meter and multi tester understanding and testing for the correctness of specifications for instruments (audio oscillator, cathode ray oscilloscope, voltmeter and ammeter).   **(10 Lectures)**

UNIT – II : INSTRUMENTS IN THE PHYSICS LABORATORY : Theory and measurements with (i) meter bridge (ii) potentiometer (Comparison of emfs, resistances, measurement of potentials) fault finding in metre bridge and potentiometer circuits – power measurement using tree voltmeters – transformers principle, reflected impedance and winding & transformers.   **(10 Lectures)**

UNIT – III : INSTRUMENTS IN THE PHYSICS LABORATORY II: Moving coil / iron galvano meters: theory and characterization – conversion of a galvanometer into an ammeter/voltmeter and their calibration-ballistic galvanometer: construction, working (alignment) and characterization, measurement of : absolute capacity, High resistance by leakage of a capacitor and mutual inductance. **(10 Lectures)**

UNIT – IV: RADIO AND TELEVISION: Principles of radio transmission – simple receiver super heterodyne receiver and its servicing – basics of television receiver with a block diagram-simple fault finding in TV receivers and precautions to be adopted-high voltage measurement-magnetic tape recording principle and block diagram for the same-fault finding and servicing.   **(10 Lectures)**

UNIT – V: ELECTRICAL DEVICES AND OTHERS: Earthing-tube light circuit and servicing – Emergency lamp and its operation-UPS (block diagram) – simple ideas about a digital clock – alarm and sleep – frequency meter (block diagram) – Item counter – automatic street light operation. **(8 Lectures)**

Book for Study:

Modern Electronic Instrumentation and measurement techniques, A.D. Helfrick and W.D.Cooper, Prentice-Hall of India, New Delhi, 2002. Relevant portions

Total 48 hours

B.Sc. Physics – V Semester
18PHYU05N5 – (Non Major Elective-II) Agricultural Physics (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Basics of physics related to agriculture area is exposed.

Unit I: Basic concepts of physics - Importance of physics related to agriculture- physical laws – Brownian movement – Tyndoll effect – Raman Effect – Spectroscopy – Adhesion and Cohesion properties – relevant to agriculture. **(5 lectures)**

Unit II: Soil physics- soil moisture movement – physical classification of soil moisture – soil air movement – thermal diffusion in soils – thermal properties of soils – heat capacity – heat conductivity – specific heat **(5 lectures)**

Unit III: Nanophysics - nano particles – physical properties of nanoparticles – Moore's law – semi conductors – diode – biosensors – quantum dots – working principles of Transmission Electron microscope – Scanning Electron Microscope – Scanning Tunneling Microscope – their applications

(5 lectures)

Unit IV: Soil – plant - water continuum – capillary movement of water in soil and plant – tortousity of water in soils – Hysterisis effect – osmosis – diffusion **(5 lectures)**

Unit V: Physical constraints in agriculture – soil constraints – impermeability of soil – compaction methods – physical constants of soils – Soil physics as a factor in soil management. **(5 lectures)**

Practical
1. Estimation of moisture in soil and plant samples
2. Optical methods
3. Electrical and thermal properties of agro materials
4. Physical methods to prepare nanoparticles
5. Application of TEM in identifying nanofertilizers
6. Application of SEM in identifying nanoparticles
7. Visit to Nanotechnology laboratory
8. Working principle of basic Physical instruments
9. Capillary movement of water
10. Estimation of pore space in soil particles
11. Determination of bulk and particle density of soil particles
12. Detection and measurement of radio activity using Geiger Muller Counter
13. Visit to an Isotope Laboratory**(26 hours)**

Reference Books:
1. William Lambe, T. and Robert V.Whitman. 1979. Soil Mechanics. Wiley Eastern Ltd. New Delhi.
2. Helmut Kohnke, 1979. Soil Physics. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
3. Biswas, T.D. and Mukherjee, S.K. 1997. Text book of soil science. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Chinnamuthu, C.R., B.Chandrasekaran and C.Ramasamy, 2007. Nanotechnology Applications in Agriculture. TNAU Offset & Printing Press, Directorate of Open and Distance Learning, TNAU, Coimbatore.

B.Sc. Physics – V Semester
18PHYU05N6 – (Non Major Elective-II) Numerical Methods (3 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Application of Mathematical tools are embedded

UNIT – I : Interpolation; Differences – relation between differences and derivatives – differences of a polynomial – Newton's formula for forward interpolation – Backward interpolation – Central differences – Gauss's forward formula – backward formula and Sterling's interpolation formula.   **(10 Lectures)**

UNIT – II: Numerical differentiation – Numerical integration: General quadrature formula – Simpson's rule – Weddle's rule – Trapezoidal rule – curve fitting: principles of least squares – fitting a straight line, a parabola and exponential curve.   **(10 lectures)**

UNIT – III: Numerical algebra and Transcendental equation: finding approximate values of the roots – Iteration method – Bisection method – Newton Raphson method – Regula Falsi method. **(10 lectures)**

UNIT – IV: Solution to simultaneous linear equation: Back substitution – Gauss elimination method – Gauss – Jordon method – iterative methods – Gauss –Jacoby's iteration method, Gauss – Seidal Iterative method.   **(10 lectures)**

UNIT – V: Numerical solution of ordinary differential equations (ODE): Taylor's series method of ODE Euler's method – modified Euler's method – Runge-Kutta method of ODE. Solving simple problems using Computers.   **(8 lectures)**

BOOKS FOR STUDY AND REFERENCE

Numerical Mathematical Analysis – James B- Scarborough – Sixth Edn., Oxford and IBH Publishing Co., Pvt., Ltd., (1996)

Numerical Methods – A. Singaravelu , Meenakshi Publications, 1992.

Total 48 hours

B.Sc. Physics – V Semester
18PHYU05S2– (Skill Based Course) APPLIED OPTICS (2 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

THEORY: 32 Lectures

Theory includes only qualitative explanation.

Sources and Detectors **(9 Periods)**

Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einstein's coefficients, Light amplification, Characterization of laser beam, He-Ne laser, Semiconductor lasers.

Fourier Optics **(7 Periods)**

Concept of Spatial frequency filtering, Fourier transforming property of a thin lens

Holography (7 **Periods**)

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry, and character recognition

Photonics: Fibre Optics **(9 Periods)**

Optical fibres and their properties, Principal of light propagation through a fibre, The numerical aperture, Attenuation in optical fibre and attenuation limit, Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating

Reference Books:

- Fundamental of optics, F. A. Jenkins & H. E. White, 1981, Tata McGraw hill.

- LASERS: Fundamentals & applications, K.Thyagrajan & A.K.Ghatak, 2010, Tata McGraw Hill
- Fibre optics through experiments,M.R.Shenoy, S.K.Khijwania, et.al. 2009, Viva Books
- Nonlinear Optics, Robert W. Boyd, (Chapter-I), 2008, Elsevier.
- Optics, Karl Dieter Moller, Learning by computing with model examples, 2007, Springer.
- Optical Systems and Processes, Joseph Shamir, 2009, PHI Learning Pvt. Ltd.
- Optoelectronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt. Ltd.
- Optical Physics, A.Lipson, S.G.Lipson, H.Lipson, 4th Edn., 1996, Cambridge Univ. Press

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B.Sc. Physics – V Semester
18PHYU05S3– (Skill Based Course) WEATHER FORECASTING (2 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Theory: 32 Lectures

The aim of this course is not just to impart theoretical knowledge to the students but to enable them to develop an awareness and understanding regarding the causes and effects of different weather phenomenon and basic forecasting techniques

Introduction to atmosphere: Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature, with height; air temperature; requirements to measure air temperature, temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics.   **(9 Lectures)**

Measuring the weather: Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.   **(5 Lectures)**

Weather systems: Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes.   **(4 Lectures)**

Climate and Climate Change: Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate.   **(6 Lectures)**

Basics of weather forecasting: Weather forecasting: analysis and its historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

(8 Lectures)

Reference books:
1. Aviation Meteorology, I.C. Joshi, 3rd edition 2014, Himalayan Books
2. The weather Observers Hand book, Stephen Burt, 2012, Cambridge University Press.
3. Meteorology, S.R. Ghadekar, 2001, Agromet Publishers, Nagpur.
4. Text Book of Agrometeorology, S.R. Ghadekar, 2005, Agromet Publishers, Nagpur.
5. Why the weather, Charls Franklin Brooks, 1924, Chpraman & Hall, London.
6. Atmosphere and Ocean, John G. Harvey, 1995, The Artemis Press.

B.Sc. Physics –VI Semester
18PHYU0615 – Solid State Physics (3 + 0)
(For the batches joining B.Sc.in 2018-2019 and afterwards)

Scope: Basics of crystal properties are exposed.

Unit I: Crystal Physics : Introduction- lattice points and space lattice-basis and crystal structure – Unit cells and lattice parameters -- unit cells versus primitive cell- crystal systems – crystal symmetry – the twenty three symmetry elements in cubic crystal-to show that five-fold rotation axis is not compatible with a lattice – combination of symmetry elements- Rotation-Inversion axis – translation symmetry elements – Space groups – the Bravais space lattices – Metallic crystal structure - Relation between the density of crystal Material and Lattice constants in a cubic lattice - Other cubic structures.
(10 Lectures)

Unit II: X-Ray diffraction: Directions, Planes and Miller Indices – Important features of Miller indices of crystal Planes - important planes and directions in a cubic crystal – distribution of atoms in the atomic plane of simple cubic crystal- Reciprocal Lattice
Braggs Law – Braggs X-ray Spectrometer - Powder Crystal method - Rotating Crystal Method.
(9 Lectures)

Unit III :Thermal Properties of Solids: Introduction - Lattice specific heat – Classical theory -
Einstein's theory of Specific Heat – Debye's theory of Specific Heat – vibrational modes of a continuous medium – density of vibrational modes – Debye approximation. 5 **(9 Lectures)**

Unit IV: Superconductivity – Survey of superconductivity – Joule heating – An account of the mechanism of superconductors – Effect of Magnetic field – A.C. Resistivity – Critical currents – Meissner Effect – Thermal properties – The Energy Gap – mechanical effects – The penetration depth – Type I and Type II superconductors – London Equations.
(**10 Lectures)**

Unit V: Physics of Semiconductors: Introduction – The Band structure of Semiconductors – Intrinsic semiconductors – Conductivity and temperature – Statistics of electrons and holes in intrinsic semiconductors – statistics of extrinsic semiconductors – mechanism of current conduction in semiconductors. **(10 Lectures)**

Book for Study
1. Solid State Physics by S.O. Pillai , New Age International Publishers, V Edn (2002)
  Unit I   : Pages 100 to 127.
  Unit II   : Pages 127 to 138, and Pages 154 to 166.
  Unit III   : Pages 375 to 395
  Unit IV   : Pages 400 to 425
  Unit V   : Pages 595 to 640.

Book for references:
1) Introduction to Solid State Physics by C. Kittel , Wiley Eastern (1984)
2) Elements of Solid State Physics by Ali Omar , Addison Wesley(1998)

Total 48 hours

B.Sc.   Physics   –VI   Semester
18PHYU0619 – Quantum Mechanics (4 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Application of quantum mechanics as a tool to solve fundamental physics problems

Unit I: Origin of the Quantum Theory:Limitation of classical physics- Planck`s quantum hypothesis-Einstein`s theory of photoelectric effect-Compton effect- quantum theory of specific heat-Bohr theory of Hydrogen atom-existence of stationary states-Wilson- Sommerfeld quantisation rule –Elliptic orbit of Hydrogen atom-the Harmonic oscillator-the rigid rotator-particle in a box-the correspondence principle-the Stern-Gerlach experiment –inadequacy of Quantum theory.   **(13 Lectures)**

Unit II: Wave Mechanical Concepts:Wave nature of particle –the uncertainty principle – the principle of superposition-wave packet-time dependent Schrodinger equation – interpretation of wave function—Eherenfest theorem – time independent Schrodinger equation-Stationary states-admissibility condition on the wave function.   **(13 Lectures)**

Unit III: Genral Formalism of Quantum Mechanics: Linear operator – eigen function and eigenvalues - Hermitian operator- postulates of quantum mechanics - simultaneous measurability of observables - general uncertainty relation – relevant problems.   **(13 Lectures)**

Unit IV: One Dimensional Energy Eigenvalue Problems: Square-well potential with rigid walls - square well potential with finite walls - square potential barrier - alpha emission – linear harmonic oscillator: Schrodinger method.   **(13 Lectures)**

Unit V: Three Dimensional Energy Eigenvalue Problems: particle moving in a spherically symmetric potential – system of two interacting particles –hydrogen atom – Hydrogenic orbitals –three dimensional square well potential.   **(12 Lectures)**

Book for study
1. Quantum Mechanics by G.Aruldhas (PHI) -2006
       Unit I : Pages: 1 to 21 of chapter 1.
       Unit II   : Pages 22 to 48 of chapter 2.
       Unit III   : Pages 53 to 62 of chapter 3.
       Unit IV   : Pages 81 to 90 and pages 95 to 100.
       Unit V   : Pages 114 to 130 and 132 of chapter 5.

References:
1. Quantum Mechanics by J.L. Powell and B. Crasemann, Oxford & IBH Publishing
   (1961).
2. A Text book of Quantum Mechanics by P.M.Mathews and K.Venkatesan, TMH
   (1971)

Total 64 hours

B.Sc. Physics –VI Semester
18PHYU0617 – Spectroscopy (4 + 0)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Exposure of various spectroscopic techniques are introduced.

UNIT – I: Spectra of Atoms; Hydrogen Spectrum – Angular Momentum – Larmor Precession – Energy of a Magnetic Moment in a Magnetic Field – The Vector Atom Model – Spin-Orbit Interaction – Spectra of Alkali Atoms – Angular Momentum of Many Electron Atoms – Energy Levels and Spectral Transitions of Helium – Spectral Terms of Equivalent Electrons – Normal Zeeman Effect – Anomalous Zeeman Effect – Paschen-Bach Effect – Influence of Nuclear Spin-Hyperfine Structure – Stark Effect – Rydberg Atoms – Lamb Shift – Characteristic X-Ray Spectra – Moseley's Law – Molecular Orbital Method.   **(12 Lectures)**

UNIT – II: Visible spectroscopy: Theory of spectrophotometry and colorimetry –Lambart's law – Beer's law – Deviation from Beer's law – Instrumentation: Source- Filters and monochromators –Sample cells – Detection – photo electric colorimeters – single beam and double beam instruments – quantitative analysis.   **(10 Lectures)**

UNIT – III: Infrared Spectroscopy: The vibrating diatomic molecule – Energy of a diatomic molecule – simple harmonic oscillator – Anharmonic oscillator – Diatomic vibrating rotator – vibrations of polyatomic molecules – fundamental vibrations and their symmetry – Overtones and combination frequencies – Double and single beam I.R. spectrophotometer operation.   **(12 Lectures)**

UNIT – IV: Raman Spectroscopy : Quantum and classical theory of Raman effect – Pure rotational Raman spectra of linear molecules – Rule of mutual exclusion – Vibrational Raman spectra – Rotational fine structure – structure determination from Raman and IR Spectroscopy – Techniques and Instrumentation.   **(12 Lectures)**

UNIT – V: Electronic Spectroscopy: Electronic Spectra of diatomic molecules - The Born – Oppenheimer Approximation – Vibrational Coarse Structure – Franck-Condon Principle – Dissociation Energy and Dissociation Products – Rotational Fine Structure of Electronic-Vibration Transitions – Fortrat Diagram – Pre dissociation.   **(12 Lectures)**

BOOKS FOR STUDY :

1. Molecular structure and Spectroscopy, G.Aruldhas, Prentice Hall of India Private Limited, New Delhi – 110 001, Third Printing.
    Unit I : Page No: 56 – 91
2. Fundamentals of Molecular Spectroscopy, C.N. Banwell and M.Mc. Cash, IVth Edition, Tata McGraw Hill (1996).

   Unit-III : Pages:55–66; 71–75; 91–93, chapter 3.

   Unit- IV: Pages:100–106; 112, 113–116; 119–124 .   **Total 58 hours**

B.Sc. Physics – VI Semester
18PHYU0618 – Practical – VI (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

1. Photography – Developing and printing
2. CDS – Photographing arc spectra-Hartmann's formula
3. Solar Spectrum – Spectrometer
4. Rydberg's constants.
5. Ellipic and hyperbolic frings – Determination of Elastic constants
6. Determination of Plank's constant
7. Determination of charge of an electron
8. Design of regulated power suppliers – IC 723, IC 7805 and study of regulation
9. Study of Basic Logic gates – Transistor and IC version
10. OPAMP – 741 as amplifier, inverting, non-inverting – Unit gain buffer. Integrator, differentiator, summer, solution of equations, wave form generator
11. Multi vibrators – Transistor, OPAMP and IC 555.
12. Study of 555 Timer
13. Study of trouble shooting in some simple electronic circuits
14. Michelson interferometer
15. Study of Doppler Effect
16. Verification of Boolean relations DeMorgan's theorem – Combinational Logic
17. Half adder, full adder and half subtractor

B.Sc., (Physics) – VI Semester
18PHYU06M1 (Modular Course - I/II) Statistical Mechanics (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: An exposure on dealing with large number of particles in the form of probability concept has been introduced.

UNIT – I : Statistical Mechanics : Microstate and macrostate – thermodynamic probability – Bose-Einsterin, Fermi – Dirac, Maxwell - Boltzmann statistics – Bose-Einsterin, Fermi – Dirac and Maxwell - Boltzmann - Distribution function. The partition function.

(12 Lectures)

UNIT II : Application of Statistical Mechanics: Distribution of molecular velocities – Experimental verification – Einstein's theory of specific heat capacity of a solid – Debye theory of specific heat capacity of solids – Black body radiation – The electron gas. **(12 Lectures)**

BOOKS FOR STUDY :

Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W.Sears and Gerhadd L. Salinger – Third Edition, Narosa Publishing House.

Unit I : Pages: 302–337 of chapter 11.

Unit II : Pages: 354–366 of chapter 12, and Pages: 386–398;407–416 of chapter 13

B.Sc. Physics – VI Semester
18PHYU06M2 (Modular Course - I/II) Electric Circuit Analysis (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Electrical network theorem and electrical component properties are exposed.

UNIT – I : Network Theorem: Thevenin's theorem – Norton's theorem – Superposition theorems - Maximum power transfer theorem – solving networks using theorems- current through the galvanometer in an unbalanced Wheatstone's bridge – sensitivity of Wheatstone's bridge – Carey Foster's bridge – Calibration of Carey Foster's bridge – Kelvin's double bridge. Ballistic Galvanometer – its theory and damping correction.   **(10 Lectures)**

UNIT – II : Transient Phenomena: Growth and decay of current in an LR circuit-time constant – charging and discharging of a capacisot through a resistor – CR and LCR circuits measurement of High resistance by leakage – mutual inductance between a pair of coils – self inductance by Rayleigh's bridge.

AC CIRCUIT THEORY : AC quantities as vectors – LR, CR, LCR series and paralalel circuits – resonance, sharpness of resonance – Q factor of a coil, power in AC circuits – AC bridges – Maxwell's bridge – Schering bridge – De Sauty's bridge – Anderson's bridge.   **(14 Lectures)**

BOOKS FOR STUDY:

Electricity and magnetism – K.K. Tiwari, S. Chand and Co.,
Unit I
Electricity and Magnetism by K.K. Tiwari
Pages: 769–790 of chapter 18; Pages: 311–323 of chapter 8;
Pages: 344–353 of chapter 9
Electricity and Magnetism by Sehgal-Chopra-Sehgal
Pages: 2.143–2.147 of chapter 5

Unit-II

Electricity and Magnetism by Sehgal-Chopra-Sehgal
Pages: 2.278–2.298 of chapter 10
Electricity and Magnetism by K.K. Tiwari
Pages: 453–456; 468–506 of chapter 11.
Pages: 706–745 of chapter 16; 754–760 of chapter 17

Total 24 hours

B.Sc. Physics – VI Semester
18PHYU06M3 (Modular Course -I/II) Optic Communication (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: Laser properties and its applications are introduced.

UNIT I : Properties of laser light, Q-Switching and mode locking: single mode and multimode lasers : Lamb Dip, mode locking of multimode lasers, Q-Switching – Ammonia maser, Gas lasers, Solid State Lasers, Dye Lasers, Semiconductor lasers, Non linear optics : Second Harmonic generation, Phase matching, Self focusing of light.   **(10 Lectures)**

UNIT II : FIBRE OPTICS : Introduction – Nature of light, basic optical laws, optical fibre modes and configurations; Fibre types, Rays and modes, step index fibre structure, Ray-optics representation, wave representation, wave equation for step index fibres, model equation, Modes in Step-Index fibers, linearly polarized modes, Power flow in step-index fibres, single mode fibres – propagation modes, Graded-Index fibre structure – Numerical aperture and modes, Attenuation : absorption, Scattering losses, bending losses, Core and Cladding losses, Fibre Optic cables – Fibre optic communication system and its advantages – Specific applications on Fiber Optics.   **(14 Lectures)**

Books for Study

    1.Lasers and Non linear Optics, B.B. Laud, Wiley Eastern Ltd., New Delhi, 1992,

    Unit I Chapter 13 : PP 178 – 188.

    2. Optical fibre communication, Gerd Keiser, McGraw Hill, International edns, New York 1991, Unit II Chapter 2, Chapter2 PP 16-59, 73 – 75, 85 – 96.

BOOKS FOR REFERENCES:

1. Optics, Ajoy Ghatak, Tata McGraw Hill, New Delhi, 1995.
2. Lasers, Theory and Applications, A.K. Ghatak & K. Thiagarajan, Macmillan India Ltd., Delhi 1984.

B.Sc. Physics – VI Semester
18PHYU06M4 (Modular Course I/II) Radiation Safety (0+2)
(For the batches joining B.Sc. in 2018-2019 and afterwards)

Scope: The aim of this course is for awareness and understanding regarding radiation hazards and safety. The list of laboratory skills and experiments listed below the course are to be done in continuation of the topics.

Unit I : Interaction of Radiation with matter: Types of Radiation: Alpha, Beta, Gamma and Neutron and their sources, sealed and unsealed sources, Interaction of Photons - Photo-electric effect, Compton Scattering, Pair Production, Linear and Mass Attenuation Coefficients, Interaction of Charged Particles: Heavy charged particles – Beth-Bloch Formula, Scaling laws, Mass Stopping Power, Range, Straggling, Channeling and Cherenkov radiation. Beta Particles – Collision and Radiation loss (Bremsstrahlung),Interaction of Neutrons - Collision, slowing down and Moderation.

(10 lectures)

Radiation safety management: Biological effects of ionizing radiation, Operational limits and basics of radiation hazards evaluation and control: radiation protection standards, International Commission on Radiological Protection (ICRP) principles, justification, optimization, limitation, introduction of safety and risk management of radiation. Nuclear waste and disposal management. Brief idea about Accelerator driven Sub-critical system (ADS) for waste management.

(10 lectures)

Unit II : Radiation detection and monitoring devices: Radiation Quantities and Units: Basic idea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose, effective dose, collective equivalent dose. Annual Limit of Intake (ALI) and derived Air Concentration (DAC).
Radiation detection: Basic concept and working principles of gas detectors (Ionization Chambers, Proportional Counter, Multi-Wire Proportional Counters (MWPC) and Gieger Muller Counter), Scintillation Detector (Inorganic and Organic Scintillators), Solid States Detectors and Neutron Detectors, Thermo luminescent Dosimetry.

(10 lectures)

Experiments:
1. Study the background radiation levels using Radiation meter
Characteristics of Geiger Muller (GM) Counter:
2. Study of characteristics of GM tube and determination of operating voltage and plateau length using background radiation as source (without commercial source).
3. Study of counting statistics using background radiation using GM counter.
4. Study of radiation in various materials (e.g. KSO_4 etc.). Investigation of possible radiation in different routine materials by operating GM at operating voltage.
5. Study of absorption of beta particles in Aluminum using GM counter.
6. Detection of a particles using reference source & determining its half life spark counter
7. Gamma spectrum of Gas Light mantle (Source of Thorium)

Reference Books:

1. W.E.Burcham and M. Jobes – Nuclear and Particle Physics - Longman (1995)
2. G.F.Knoll, Radiation detection and measurements.
3. Thermoluninescense Dosimetry, Mcknlay, A.F., Bristol, Adam Hilger
   (Medical Physics Handbook 5)
4. W.J.Meredith and J.B.Massey, "Fundamental Physics of Radiology".
   John Wright and Sons, UK, 1989.
5. J.R.Greening, "Fundamentals of Radiation Dosimetry", Medical Physics Hand Book
Series, No.6, Adam Hilger Ltd., Bristol 1981.
6. Practical Applications of Radioactivity and Nuclear Radiation, G.C. Lowental and
   P.L.Airey, Cambridge University Press, U.K., 2001.
7. A.Martin and S.A. Harbisor, an Introduction to Radiation Protection, John Willey & Sons,
   Inc. New York, 1981.
8. NCRP, ICRP, ICRU, IAEA, AERB Publications.
9. W.R. Hendee, "Medical Radiation Physics", Year Book – Medical Publishers Inc. London,
1981.

SEMESTER – I (Maths Major) / SEMESTER – III (Chemistry Major)

Allied Physics for B.Sc. Mathematics and Chemistry Major

18PHYU01A1 / 18PHYU03A1 Allied Physics – I (3+0)

(For the batches joining B.Sc., in 2018-2019 and afterwards)

Objectives: To impart basic knowledge needed to work with the major subject that the students are studying

Specific Objectives of learning (SOL): At the end of the course the student should be able to gain enough knowledge to effectively learn the subjects in which they will be majoring

UNIT I : ACCELERATION DUE TO GRAVITY AND GRAVITATION: Acceleration due to gravity-compound pendulum-interchangeability of centres of suspension and oscillation-determination of 'g' using a bar pendulum-determination of radius of gyration. Factors affecting the values of 'g" - effect of rotation - altitude - depth.

Gravitaion: Kepler's laws (No mathematical derivation) - Newton's law- density of Earth- mass of the Earth and the Sun- Gravitational Field-Gravitational Potential- Potential energy- Gravitational potential at a point distance 'r' from a body of mass-Gravitational potential outside a spherical shell and a solid sphere. Inertial and gravitational mass.   **(12 Lectures)**

UNIT II: VISCOSITY AND SURFACE TENSION: Stream lined and turbulent motion – coefficient of Viscosity – Poiseuille's flow – Experimental determination of coefficient of viscosity – motion in a viscous medium – Stoke's law – comparison of viscosities – Ostwald Viscometer. Surface tension – Explanation – surface film and surface energy – Free energy of a surface – Excess of pressure inside the drops and bubbles – Rise of a liquid in a capillary tube – Experimental determination of surface tension – Jaeger's method, Drop weight method and capillary rise method.   **(10 Lectures)**

UNIT III: SOUND: Velocity of longitudinal waves in gases – Newton's law of velocity of sound--Laplace's correction – Effect of density ,humidity and wind - velocity of sound in water and in air-measurement of sound intensity-idea of decibel.

Ultrasonics: Production- Magnetostriction Method -Piezo-electric Effect- determination of velocity-Acoustic Grating-Applications of ultrasonics (any two)   **(10 Lectures)**

UNIT IV : Interference – Condition for interference – Young's experiment – Fresnel biprism – Bi-mirror – Lloyd's single mirror – Fringes with while light – Colours of thin films – Reflected and transmitted systems – Newton's rings – Air wedge – Testing of planeness of a surface.   **(10 Lectures)**

UNIT V : Polarisation – Reflection and Refraction – Brewster's law – Double refraction – Nicol prism and its uses – Rotation of plane of polarization – specific rotatory power and saccharimetry.**(6 Lectures)**

                Total   48 hours

Books for Study:

1. Elements of Properties of matter - D.S. Mathur

2. Fundamentals of Optics - Khanna and Gulati

3. A text book on Sound - Khanna and Bedi

4. Optics - Ajoy Ghatak

5. A text book of Optics- Subrahmanyam and Brij Lal

6. A text book of Sound - Subrahmanyam and Brij Lal

7. Properties of Matter- Subrahmanyam and Brij Lal

BOOKS FOR REFERENCE:

Physics – V Edition. Volume I David Halliday, Robert Resnick – Jearl Walker – Asian Books,

SEMESTER – I (Maths Major) / SEMESTER – III (Chemistry Major)
Allied Physics for B.Sc. Mathematics and Chemistry Major
18PHYU02A3 / 18PHYU04A3 Allied Physics – I (0+2)

PRACTICAL
(For the batches joining B.Sc. in 2018-2019 and afterwards)

1. Measuring instruments – Vernier caliper , Screw gauge , Vernier microscope
2. Single optic lever – measurements of thickness.
3. Surface tension – capillary rise method.
4. Viscosity – Poiseuille's method.
5. Bending of beams – cantilever, uniform and non-uniform bending.
6. Newton's law of cooling- verification, specific heat of liquid.
7. Specific heat of solid/ liquid method of mixture.
8. Lee's disc experiment – thermal conductivity of poor conductor.
9. Joule's law – specific heat of liquid.
10. Comparison of magnetic moments – field aiding, field opposing.
11. Meter bridge – resistance of coil, specific resistance.
12. Figure of merit of table galvanometer.
13. Focal length of long focus convex lens, concave lens.
14. Spectrometer – refractive of prism and liquid.
15. Compound pendulum – determination of g and radius of gyration.
16. Diode characteristics
17. Transistor characteristics.

SEMESTER – II (Maths Major) / SEMESTER – IV (Chemistry Major)

Allied Physics for B.Sc., Mathematics and Chemistry Major

18PHYU02A2 / 18PHYU04A2

Allied Physics – II (3+0) (For the batches joining B.Sc., in 2018-2019 and afterwards) Objectives: To impart basic knowledge needed to work with the major subject that the students are studying Specific Objectives of learning (SOL): At the end of the course the student should be able to gain enough knowledge to effectively learn the subjects in which they will be majoring

UNIT I: DC AND AC CIRCUITS :

DC CIRCUITS: Kirchoff's law on voltages and currents – maximum power transfer theorem Wheatstone's bridge – Carey Foster's bridge – capacitors action, parallel plate and cylindrical capacitors – parallel and series connection of capacitors – energy stored in capacitors

AC CIRCUITS: Peak, mean and rms values of ac – relation between current and voltage in capacitors and inductors – transformers: reflected impedance, losses in transformers – RC , LR circuits, and LCR circuits.

UNIT II: ANALOG AND DIGITAL ELECTRONICS :

Semiconductor electronics-Diode-Zener diode-Half and Full wave rectifiers-ideas of filters-Transistors-biasing of a transistor-input and output characteristics-single stage CE amplifier and its frequency response-Feed- back and its effects-oscillators-Colpitt's and Hartley oscillator.

Logic gates - their symbol and truth table-Universal gates NAND and NOR -Boolean Identities - De Morgan's theorem-Half-Adder and Full-Adder-solving Boolean equations using laws and theorems.

UNIT III: Particle properties of waves-Black body radiation-Photoelectric effect-Compton effect-de Broglie wave-phase and group velocities-wave nature of X-ray- Diffraction of X-ray by crystal-Bragg's Law. Vector atom model- fine structure of Hydrogen spectrum-Pauli's exclusion principle-Stern and Gerlack experiment.

UNIT IV: Becquerel rays- α, β, γ properties- laws of radioactivity- decay constant- half life – mean life – carbon dating – age of the earth – basic ideas of equilibrium in radioactivity – discovery of neutron – properties – nuclear fission and fusion reactions – liquid drop model (qualitative treatment only) – nuclear reactor – fissile materials – moderators – chain reactions – application of radioisotopes, medicine and agricultural – accelerators- linear accelerators- cyclotron – synchro cyclotron – detector: ionization chamber – G.M. Counter.

UNIT – V: Lasers: Introduction-Einstein coefficients – Light amplification – Threshold condition – Cavity resonator – Pumping – Ruby – He-Ne – Dye laser and diode laser –Basic ideas on optical communication – Optical fiber and types – Losses – Sources and detectors - Laser application in medicine industry and metrology.

Books for study:

1. Electricity and Magnetism with Electronics – K.K. Tiwari.
2. Concepts of Modern Physics, Arthur Beiser Tata McGraw Hill Co
3. Atomic Physics, J.B.Rajam, S.Chand Co
4. Modern Physics – Seghal, Chopra, Seghal, S. Chand, New Delhi.
5. Basic electronics and linear circuits – Bhargava Kulshreshtha and Gupta – TTTI   Publications, Chandigarh
6. Digital Principles – Malvino and Leach, McGraw Hill.
7. Nuclear physics by D.C. Dhayal (Himalaya Publishing House-Fifth revised & enlarged edition

II SEMESTER
18AGP00201 - FUNDAMENTALS OF AGRICULTURAL PHYSICS
(2+1)

Unit I:

Basic concepts of physics - Importance of physics related to agriculture- physical laws –

Brownian movement – Tyndoll effect – Raman Effect – Spectroscopy – Adhesion and Cohesionproperties – relevant to agriculture **(6 Lectures)**

Unit II:

Soil physics- soil moisture movement – physical classification of soil moisture – soil air movement – thermal diffusion in soils – thermal properties of soils – heat capacity – heat conductivity – specific heat. **(6 Lectures)**

Unit III:

Nanophysics - nano particles – physical properties of nanoparticles – Moore's law – semi conductors – diode – biosensors – quantum dots – working principles of Transmission Electron microscope – Scanning Electron Microscope – Scanning Tunneling Microscope – their applications

(7 Lectures)

Unit IV:

Soil – plant - water continuum – capillary movement of water in soil and plant – tortousity ofwater in soils – Hysterisis effect – osmosis – diffusion. **(6 Lectures)**

Unit V:

Physical constraints in agriculture – soil constraints – impermeability of soil – compaction
methods – physical constants of soils – Soil physics as a factor in soil management.

(5 Lectures)

Practical
1. Estimation of moisture in soil and plant samples
2. Optical methods
3. Electrical and thermal properties of agro materials
4. Physical methods to prepare nanoparticles
5. Application of TEM in identifying nanofertilizers
6. Application of SEM in identifying nanoparticles
7. Visit to Nanotechnology laboratory
8. Working principle of basic Physical instruments
9. Capillary movement of water
10. Estimation of pore space in soil particles
11. Determination of bulk and particle density of soil particles
12. Detection and measurement of radio activity using Geiger Muller Counter
13. Visit to an Isotope Laboratory

Reference Books:
1. William Lambe, T. and Robert V.Whitman. 1979. Soil Mechanics. Wiley Eastern Ltd. New Delhi.
2. Helmut Kohnke, 1979. Soil Physics. Tata McGraw-Hill Publishing Company Ltd. NewDelhi.
3. Biswas, T.D. and Mukherjee, S.K. 1997. Text book of soil science. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Chinnamuthu, C.R., B.Chandrasekaran and C.Ramasamy, 2007. Nanotechnology Applications in Agriculture. TNAU Offset & Printing Press, Directorate of Open and Distance Learning, TNAU, Coimbatore.

THE GANDHIGRAM RURAL INSTITUTE
(Deemed to be University)

Ministry of Human Resource Development, Govt.of India

B.Sc.B.Ed SYLLABUS (Four Year Integrated)
(2018-2019 Onwards)

FOUR YEAR – EIGHT SEMESTER PROGRAMME

DEPARTMENT OF EDUCATION
SCHOOL OF SOCIAL SCIENCES
GANDHIGRAM, DINDIGUL – 624 302.
TAMILNADU, INDIA.

<u>MINUTES OF THE MEETING OF THE BOARD OF STUDIES IN EDUCATION AND PHYSICAL EDUCATION HELD ON **23-05-2018** AT 11.45 A.M IN THE DEPARTMENT OF EDUCATION, GRI- DEEMED UNIVERSITY, GANDHIGRAM</u>

<u>Members Present:</u>

1. Dr.A.Jahitha Begum,
   Professor & Head i/c
   Department of Education, GRI, Gandhigram   -Chairperson

2. Dr.G.Lokanadha Reddy
   Professor& Dean,
   School of Education& HRD, DravidanUniversity
   Kuppam, Andhra Pradesh-State   -Member

3. Dr.E.Ramganesh
   Professor & Head
   Department of Educational Technology
   Bharathidasan University, Trichy   -Member

4. Dr.S.Ramaa
   Professor & Dean of the Instruction (Academic)
   Regional Institute of Education, Mysore   -Special Invitee

5. Dr.K.Chandrasekaran,
   Professor & Head
   Department of Physical Education,
   School of Education,
   Madurai Kamaraj University, Madurai   -Member

6. Dr.C.Sugumar
   Head, Department of Physical Education & Yoga Centre
   GRI, Gandhigram.   -Member

7. Dr.P.S.Sreedevi
   Assistant Professor in Education
   Department of Education, GRI, Gandhigram.   -Member

8. Dr.N.Devaki
   Assistant Professor in Education
   Department of Education, GRI, Gandhigram.   -Member

9. Dr.K.K.Murugan
   Assistant Professor in Education
   Department of Education, GRI, Gandhigram   -Special Invitee

10. Dr.R.BagdhaVatchalaPerumal
    Assistant Professor
    Department of Education, GRI, Gandhigram   -Special Invitee

11. Dr.P.Ponnusamy
    Assistant Professor
    Department of Education, GRI, Gandhigram   -Special Invitee

The Chairperson introduced the faculty members of the Department and highlighted the accomplishments and the courses offered such as B.Ed, M.Ed & Ph.D in the department at present.

The following agenda were taken for discussion.

▶ To finalize the syllabus for Two Year B.Ed Programme as per NCTE Guidelines, 2014.
▶ To finalize the B.Sc., B.Ed (Four Year Integrated) course syllabus to be offered from the academic session 2018-2019, as per NCTE Guidelines, 2014.
▶ To finalize the M.Ed Syllabus.
▶ To finalize and approve the "Integrated M.Phil-Ph.D" in Education syllabus from the academic session 2018-2019.
▶ To finalize and approve the **"PG Diploma in Educational Cognitive Science"** syllabus from the academic session 2018-20-19.
▶ Any other matter.

The following Resolutions were made in the BOS Meeting:

1. The Board finalized and approved the syllabus of Two New Programmes from the academic session 2018-2019.

    - **Integrated M.Phil-Ph.D**
    - **P.G. Diploma in Educational Cognitive Science**

2. The Two Year B.Ed, B.Sc.B.Ed and M.Ed syllabus were thoroughly discussed and fine tuned as per the suggestions emerged in the Board of Studies meeting as given below.

B.Sc., B.Ed
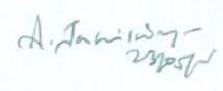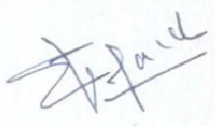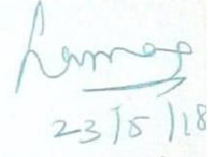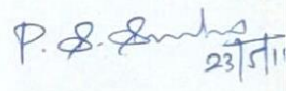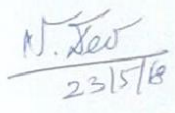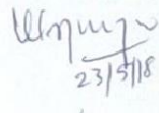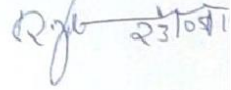
The following corrections were done in the B.Sc., B.Ed syllabus.
o The core papers are mentioned as Perspectives in Education (PE)
o The Methodology papers are mentioned as Curriculum of Pedagogic Studies (CPS)
o The Elective Course be mentioned as Elective Pedagogic Course(EPC)
o The school internship and other practical aspects be indicated asPractum(PR)

M.Ed

1. A **"Core Choice"** paper in the I semester for "Information and Communication Technology (code 15EDNP 0103)", "Distance Education and Virtual Learning (code 18EDNP 0103)" is introduced.

2. A "**Value Added Course"** Health and Yoga Education (18EDNP 01V1) is introduced in the IV Semester of M.Ed syllabus.

3. The Board suggested to update the references and websites for all the papers, wherever necessary.

4. The board suggested that thePG Diploma in Educational Cognitive Science may be offered to II Year M.Ed and Ph.D (Part-Time) Scholars as an Add-on course.

5. The Board permitted the Chairperson to carry out the necessary modifications in the courses offered by the Department of Education comply with CBCS regulations of GRI.

The meeting came to end by at 5 PM.

Signature

1. Dr.A.Jahitha Begum,
   Professor & Head i/c
   Department of Education, GRI, Gandhigram   -Chairperson

2. Dr.G.Lokanadha Reddy
   Professor & Dean,
   School of Education & HRD, Dravidan University
   Kuppam, Andhra Pradesh-State   -Member

3. Dr.E.Ramganesh
   Professor & Head
   Department of Educational Technology
   Bharathidasan University, Trichy   -Member

4. Dr.S.Ramaa
   Professor & Dean of the Instruction (Academic)
   Regional Institute of Education, Mysore   -Special Invitee

5. Dr.K.Chandrasekaran,
   Professor & Head
   Department of Physical Education,
   School of Education,
   Madurai Kamaraj University, Madurai   -Member

6. Dr.C.Sugumar
   Deputy Director, Physical Education & Yoga Centre
   GRI, Gandhigram.   -Member

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   Assistant Professor in Education
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    Assistant Professor
    Department of Education, GRI, Gandhigram   -Special Invitee

Four Year Integrated B.Sc. B.Ed Programme

Preface

The National knowledge commission (NKC) has observed that teachers are the single most important element of the school system. The prosperity of a nation depends on its enlightened human resource, which depends on the quality of education. Quality relies on a teacher which in turn relies on quality of teacher education. The four year Integrated B.Sc.B.Ed course is a pre-service teacher training programme of NCTE under Regulation, 2014 with basic objective to prepare quality of secondary school teachers in Science and Mathematics in Indian school system. NCTE 2014, emphasised on introduction of four year integrated B.Sc. B.Ed and B.A.B.Ed programme in all central Universities. This tertiary level programme is a link between higher secondary education and post graduate level education. The programme aims at integrating general studies comprising Science and Professional studies comprising foundations of education, pedagogy of school subjects and practicum related to the tasks and functions of a school teacher. It maintains a balance between theory and practice, and coherence and integration among the components of the programme. The course also ensures opportunities for higher learning of the students. The syllabus is designed in eight semesters. B.Sc, B.Ed is offered in Mathematics, Physics and Chemistry under the umbrella of Sciences.

Objectives of the Course

- To provide excellence in the field of teacher education resulting in generating quality teachers.
- To develop content as well as pedagogical knowledge of the students.
- To acquaint the prospective-teachers with innovative teaching practices as envisaged in National Curriculum Framework for Teacher Education.
- To sensitize emerging issues such as environment, population, gender equality and peace education.

Unique Features of the Programme

- Compulsory Non credit Course on Gandhian Thought.
- Choice Based Credit System (CBCS)
- Vocational Training
- Group Project
- Village Placement Programme(VPP)
- ICT & E – Content Development Training
- Soft skills and Communication skills training
- Introduction to Cognitive Science

Duration of the Course:

Duration of the programme shall be of four academic years comprising eightsemesters with 250 Working days / academic year.

Medium of Instruction

The medium of instruction is English.

Eligibility for Admission

- A Pass in Higher Secondary School Examination (10+2 Pattern) with the minimum of 50% from a recognized board with the subjects Physics/ Chemistry/Mathematics.
- The reservation and relaxation in marks for SC/ST/OBC/PWD and other category shall be as per the rules of Government of India.

Course outline for B.Sc.B.Ed Programme (2018-2019 onwards)

S.NO	Category	Course Code	Title of the Course	No. of Credits	Hours	CFA	ESE	Total
			SEMESTER I					
1.	Core Course (PE)	18EDNU0101	Basics of Teaching and Learning	4	4	40	60	100
			SEMESTER II					
2.	Core Course (PE)	18EDNU0202	Psycho – Social and Philosophical Bases of Education	4	4	40	60	100
3.	Practicum (PR –SI 1)	18EDNU03P1	School Internship (Phase I)	4		100		100
			SEMESTER III					
4.	Core Course (PE)	18EDNU0303	Education in Contemporary India	4	4	40	60	100
			SEMESTER IV					
5.	Core Course (PE)	18EDNU0404	Childhood and Growing Up	4	4	40	60	100
6.	Practicum (PR –SI 2)	18EDNU05P2	School Internship(Phase II)	4		100		100
			SEMESTER V					
7.	Core Course (PE)	18EDNU0505	Techno Pedagogy	4	4	40	60	100
			SEMESTER VI					
8.	Core Course (PE)	18EDNU0606	Curriculum and School	4	4	40	60	100
			SEMESTER VII					
9.	Core Course (PE)	18EDNU0707	Learner and Learning	4	4	40	60	100
10.	Core Course (PE)	18EDNU0708	Cognitive Science	4	4	40	60	100
11.	Elective (EPC)	18EDNU07EX	Any one from the List	4	4	40	60	100
12.	Optional Subject Group-I, (CPS) (Any One)	18EDNU07O1	Pedagogy of Language English - I	4	4	40	60	100
		18EDNU07O2	Pedagogy of Language Tamil - I					
	Optional Subject Group – II (CPS) (Any One)	18EDNU07O3	Pedagogy of Mathematics - I	4	4	40	60	100
		18EDNU07O4	Pedagogy of Physical Science - I					
13.	Practicum (PR –SI 3)	18EDNU07P3	School Internship(Phase III)	6		75	75	150
			SEMESTER VIII					
14.	Core Course (PE)	18EDNU0809	Elements of Inclusive Education	4	4	40	60	100
15.	Core Course (PE)	18EDNU0810	School Management, Leadership and Action Research	4	4	40	60	100
16.	Optional Subject Group-I, (CPS) (Any One)	18EDNU08O1	Pedagogy of Language English - I	4	4	40	60	100
		18EDNU08O2	Pedagogy of Language Tamil - I					
	Optional Subject Group – II (CPS) (Any One)	18EDNU08O3	Pedagogy of Mathematics - I	4	4	40	60	100
		18EDNU08O4	Pedagogy of Physical Science - I					
17.	Practicum (PR –SI 4)	18EDNU08P4	School Internship (Phase-IV)	6	-	75	75	150
18.	Project	18EDNU0811	Project Work	4		40	40+20	100
19.	Modular Course (EPC)	18EDNU 08M1	Teaching Learning Materials(TLM) Preparation	2	2	50	-	50
		18EDNU 08M2	Environmental Education					
20.	Compulsory Non-Credit Course (EPC)	18EXNU 08F3	Extension Work in Villages	-	-	50	-	50
			Total	86		1090	1110	2200

Total Core Papers- 10   Total Elective Papers- 6   Total Optional Papers- 4

Total Marks in Theory=1600   Total Marks in Practicum =500

List of Courses for 17EDNU07EX

18EDNU07E1	Assessment and Evaluation
18EDNU07E2	Guidance and Counselling
18EDNU07E3	Health and Yoga Education
18EDNU07E4	Vocational Education and Training
18EDNU07E5	Aesthetic and creative Education
18EDNU07E6	Gender Issues in Education

List of Courses for 17EDNU07OX

18EDNU07O1	Pedagogy of Language-English-I
18EDNU07O2	Pedagogy of Language-Tamil-I

List of Courses for 17EDNU07OY

18EDNU07O3	Pedagogy of Mathematics-I
18EDNU07O4	Pedagogy of Physical Science-I

List of Courses for 17EDNU08OX

18EDNU08O5	Pedagogy of Language-English-II
18EDNU08O6	Pedagogy of Language-Tamil-II

List of Courses for 17EDNU08OY

18EDNU08O7	Pedagogy of Mathematics-II
18EDNU08O8	Pedagogy of Physical Science-II

Practicum

Practicum Comprises of the following

- **School Internship**
- **Records**
- **Psychological Experiments.**

I. School Internship:

School experience and internship in teaching is an integral component of a teacher preparation program to help student teachers learn and enhance their professional role. The school experience are designed to help teacher candidates observe and understand the fundamentals of practice, and to gradually assume full responsibility for classroom teaching

during the internship in teaching experience. During the programme, the duration ofinternship will be 20 weeks.

Schedule of Internship

SEMESTER	NUMBER OF WEEKS
II Semester (Phase I)	4
IV Semester (Phase II)	4
VII Semester (Phase III)	6
VIII Semester (Phase IV)	6
Total	**20**

II. Records
1. School Observation Record Optional I&II
2. Subject Practical Record Optional II
3. Micro Teaching Record Optional I&II
4. Lesson Plan Record-Optional I&II
5. Test and Measurement Record for Optional I&II
6. School Internship Record
7. Reflective Journal
8. Educational Technology Record
9. Case Study Record
10. Psychology Practical Record
11. Work Experience Record
12. Physical Education Record
13. Action Research Record
14. Remedial Teaching Record
15. Gurukula Record

III Psychological Practicals

Tachistoscope	Span of Attention
Tweezer Dexterity	Interest and Aptitude
Illusion Board	Illusion
Card Sorting Tray	Transfer of Learning
Bhatia's Battery-	Intelligence
Mirror Drawing Apparatus	Learning
Vygotsky's 22 Wodden Block	Concept Formation
Wallace-Kohan	Creativity Test
Happiness Inventory	
Eyesenk Personality Test	
Teacher Aptitude Test	
Job Satisfaction	
Interest Inventory	

Examination

Semester examinations will be held twice in a year. The Rules and regulations of choicebased credit system are applicable to evaluation.

DEPARTMENT OF EDUCATION
Course outline for B.Sc, B.Ed Programme

Semester	Category	Title of the Course	No. of Credits	Hours
I	Core Course	Basics of Teaching and Learning	4	4
		Total	**4**	
II	Core Course	Psycho – Social Philosophical Bases of Education	4	4
	Practicum	School Internship (Phase I)	4	
		Total	**8**	
III	Core Course	Education in Contemporary India	4	4
		Total	**4**	
IV	Core Course	Childhood and Growing Up	4	4
	Practicum	School Internship(Phase II)	4	
		Total	**8**	
V	Core Course	Techno Pedagogy	4	4
		Total	**4**	
VI	Core Course	Curriculum and School	4	4
		Total	**4**	
VII	Core Courses	Learner and Learning	4	4
		Cognitive Science	4	4
	Optional Subject Group-I	Pedagogy of Language-English-I Pedagogy of Language-Tamil-I	4	4
	Optional Subject Group II	Pedagogy of Mathematics-I Pedagogy of Physical Science-I	4	4
	Elective	Assessment and Evaluation Guidance and Counselling Health and Yoga Education Vocational Education and Training Aesthetic and creative Education Gender Issues In Education	4	4

	Practicum	School Internship(Phase III)	6	
		Total	**26**	
VIII	Core Course	Elements of Inclusive Education	4	4
		School Management, Leadership and Action Research	4	4
	Optional Subject Group III	Pedagogy of Language-English-II Pedagogy of Language-Tamil-II	4	4
	Optional Subject Group IV	Pedagogy of Mathematics-II Pedagogy of Physical Science-II	4	4
	Project	Project Work	4	-
	Practicum	School Internship (Phase-IV)	6	
		Total	**26**	
		Grand Total	**86**	

Total Core Papers- 10   Total Elective Papers- 6   Total Optional Papers- 4

Total Marks in Theory=1600   Total Marks in Practicum =500

SEMESTER-I

18EDNU0101: BASICS OF TEACHING AND LEARNING

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective

        To make the students familiarize with Basic aspects of Teaching and Learning

Special outcomes of Learning

        The student will be able to

- acquaint with the concept of teaching and its components.
- develop an understanding about the concept of learning; relation between teaching and learning.
- Identify teaching as a profession.
- Understand the different teaching methods.
- Familiarize with the importance of evaluation in teaching - learning.

UNIT – I: TEACHING

Teaching: Definition, Meaning, Concept, Nature, Phases, Principles, Characteristics of Goodteaching. Reflective teaching: concept, Meaning and strategies, Theories of teaching.

(Hours: 13)

UNIT – II: LEARNING

Learning: Definition, meaning, Concept, Nature, Goals, Characteristics, Types. – Structure and phases of learning, Factors influencing learning. Teaching and Learning: Relationship, significance, principles. Levels of learning: memory level, understanding and reflective level. **(Hours: 13)**

UNIT – III: TEACHING PROFESSION

Profession: Meaning, definition, characteristics. - Teaching as Profession: Characteristics and Professional traits and ethics, Teacher Appraisal and accountability. Effective teacher: Qualifications, Qualities, Duties and Responsibilities. - Training of teachers: Pre-service and In-service. **(Hours: 13)**

UNIT - IV TEACHING METHODS

Teaching Methods: Meaning, definition, characteristics, types and Factors. Various Teaching methods: Lecture, Demonstration, Discussion, Project, Assignment, Seminar, Brainstorming, Team Teaching, Computer Assisted Instruction. **(Hours: 12)**

UNIT - V EVALUATION OF TEACHING AND LEARNING

Evaluation: Concept, Meaning, Definition, Aims. – Types of evaluation: Formative and Summative – Tests: Achievement and Diagnostic - Norm Referenced and Criterion

Referenced Tests. Teacher evaluation: Need, significance, competency, efficiency and effectiveness. - Tools: Observation, checklist, maintaining records. **(Hours: 13)**

REFERENCES

1. Mangal.S.K, (2012). Essentials of Teaching-Learning and Information Technology. Ludhiana: Tandon Pub.

2. Saxena.V.K, (2010). Technology of teaching and essentials of teaching learning, Anmol Publication Pvt. Ltd, Delhi.

3. Mahesh kumar, (2013). Modern teaching of Information Technology, Anmol Publication Pvt.Ltd, New Delhi.

4. Nayak.A.K and Rao.V.K, (2011). Classroom Teaching Methods and Practices, APH Publishing Corporation. New Delhi.

5. Bhattacharya S, (1996). Foundation of Education, Atlantic Publishers, Delhi.

SEMESTER II
18EDNU0202:
PSYCHO SOCIAL AND PHILOSOPHICAL BASES OF EDUCATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
    To make the students know the basic concepts of Psycho–Social Bases of Education
Special outcomes of Learning
    The student will be able to
- Know the basic concept of education.
- Understand the concept of philosophical bases.
- Learn the concept of psychological perspective.
- Explore on the concept of sociological basis of education.
- Familiarize with the pedagogical concepts and its application in teacher education.

UNIT – I: BASICS OF EDUCATION
    Education: Concept, Meaning, Definition, Characteristics, Aims, Functions and Scope. Various forms of education. Education as science - Education as a Social Process – Educationfor Human Resources Development.   **(Hours: 12)**

UNIT – II: PHILOSOPHICAL BASES
    Philosophy: Meaning, Definition, Nature, Types, Classification and Scope. Relation between Education and Philosophy. Educational Philosophy: Meaning, Definition, Nature and Characteristics and Scope. Gandhian concept of Education for Integrated Development of Human Being. **(Hours: 12)**

UNIT – III: PSYCHOLOGICAL BASES
    Psychology: Meaning, Definition, Scope. Relation between Education and Psychology. Educational Psychology: Meaning, Definition, Nature and Characteristics and Scope. Concept of growth, development and maturation - Individual Difference – Motivation – Group dynamics – Mental Health and Hygiene.   **(Hours: 13)**

UNIT – IV: SOCIOLOGICAL BASES
    Sociology: Meaning, Definition, Characteristics. Educational Sociology: Concept, Definition, Importance and Scope. Agencies of Education – Education for socialization - Social change - Social mobility - Social stratification. School as a social sub system. Community schools and colleges - Education for social justice, democracy and citizenship.
            (Hours: 13)

UNIT – V: PEDAGOGICAL BASIS
    Taxonomy of Educational objectives – Benjamin Bloom's classification cognitive, affective and psychomotor domains. Teacher and classroom behavior – Characteristics of a good teacher behaviour - Flanders Interaction Analysis. Role and functions of teachers, as a planner, facilitator, Counselor and Researcher.   **(Hours: 13)**

REFERENCES

1. Bhattacharya S, (1996). Foundation of Education, Atlantic Publishers, Delhi.

2. Banerjee A.C. & Sharma S.R (1999). Sociological and Philosophical Issues in Education, Book Enclave, Jaipur.

3. Chaube.S.P, Akhilesh Chaube, (2002), *Western Educational Thinkers*, Concept Publishing Company, New Delhi.

4. Dash.B.N, (2000). Teacher and Education in the emerging Indian society, Neelkamal Publications, New Delhi.

Hemlata, T. (2002). Sociological Foundation of Education, Kanishka Publisher, New Delhi.

SEMESTER III

18EDNU0303: EDUCATION IN CONTEMPORARY INDIA

Credit: 4   **Max. Mark: 100**

Hours: 64

Course Objective

To make the student analyze and understand the vision of Education in Contemporary
India.

Special outcomes of Learning

The students will be able to

- know the educational Heritage of the country.
- understand the role of education and role of teacher in society.
- create involvement among students for society and development.
- analyze the various quality concerns and reforms in education.
- familiarize the concepts of values in education.

UNIT - I: OUR EDUCATIONAL HERITAGE

Education in India- Education in pre independent and post independent periods. Foundations of Education: Philosophical, Sociological and Pedagogical aspects. Influence of Hinduism, Buddhism, Jainism, Islam and Christianity on Education. Reports of Education Commissions- Secondary Education Commission(1952), Kothari Commission Report(1964- 66), National Policy on Education1986 and its revised formulation(1992). **(Hours: 13)**

UNIT – II: EDUCATIONAL THOUGHTS AND CONTRIBUTION

Educational ideas, thoughts and contribution of Indian Philosophers: Tiruvalluvar, Rabindranath Tagore - Liberationist pedagogy, Vivekananda, M.K.Gandhi- Basic Education or Education for self-sufficiency. Aurobindo Ghosh- Integral Education, J.Krishnamoorthi and A.P.J.Abdulkalam - Education for individual and social transformation. Western Philosophers- Plato - Rousseau – Dewey - Frobel – Montessori - Ivan Illich. **(Hours: 12)**

UNIT - III: EDUCATION AND GENDER ISSUES

Gender, Culture and Institution: Intersection of Class, Caste, Religion and Region Gender in text and context Teacher as an agent of change .Life skills and sexuality.
Educational rights in constitution: Secularism and Education, Equalization of Educational Opportunities, Concept of equity and quality. Education for girl child, weaker sections, differently abled children, trans gender. Right to Education Act (RTE) 2009. Education for National and International understanding. Education for Economic development: Liberalization, Privatization, Globalization and Industrialization- Education for rural development.   **(Hours: 13)**

UNIT - IV: QUALITY CONCERNS IN EDUCATION

Pre-primary in Education-Infrastructure, Enrolment and quality. Primary Education- Problems and solutions. Secondary and Higher secondary Education- various streams of Education: state board, Matriculation,, CBSE, ICSE, and NCERT. Quality concerns in Education-Employability-distance education and open learning systems. Emerging trends in Education: ABL, ALM, SALM and CCE.
                                                                                                   (Hours: 13)

UNIT - V: EMERGING GLOBAL CONCERNS IN EDUCATION

Education for social justice, communal conflict management and racism. National and International understanding. Human Rights Education - Meaning, Objectives and Principles –Human Rights Education at different levels: Primary, Secondary, Higher Education. Environmental concerns: Global-local. Education for environmental conservation and regeneration. Culture- meaning, definition, transmission and transformation of culture.

(Hours: 13)

REFERENCES
1. Anand, C.L, et al, (1993). Teacher and Education in the Emerging Indian Society, New Delhi: NCERT.
2. Chaube. S.P, Akhilesh Chaube, (2002). Western Educational Thinkers, Concept Publishing Company, New Delhi.
3. Patak, R.P.(2007). Education in the Emerging India, Atlantic Publishers& Distributors(Pvt) Ltd, New Delhi.
4. Sharma R.N., Sharma R.K. (2012) History of Education in India, Atlantic Publishers, New Delhi.
5. Singaravelu G. (2012), Education in the Emerging Indian Society, Neel Kamal Publications, New Delhi.

SEMESTER IV
18EDNU0404: CHILDHOOD AND GROWING UP

Credit-4   **Max.Marks:100**

Hours-64

Course Objective
      To make the students understand the basic ideas of Childhood and Growing Up
Specific Outcomes of Learning

Special outcomes of Learning
    The student will be able to
- develop an understanding Psychology of childhood.
- acquaint with the various aspects of growth and development of the learner.
- familiarize with the concept of learning and motivation.
- understand importance of Intelligence and Creativity.
- orient on the personality and mental health.

UNIT - I: EDUCATIONAL PSYCHOLOGY AND CHILDHOOD
    Psychology: Definition, Concept, Scope of Psychology, Branches of Psychology. Educational Psychology: Definition, Meaning and principles. Stages of development: Infancy, childhood and adolescence development; Family, schools, and community with relation to child development, Significance of Educational Psychology to the teacher.   **(Hours: 13)**

UNIT - II: GROWTH AND DELEOPMENT
    Human Growth and Development: Concept, Principles, Characteristics, Distinction among Growth, Development and Maturation. Dimensions of Development: Physical, Cognitive, Emotional, Social and Moral. Kohlberg's stages of Moral development, Piaget theory of Cognitive development.
                                                                (Hours: 13)

UNIT - III: MOTIVATION
    Motivation: Meaning, Definition, Types of Motivation, Factors influencing Motivation, Theories of Motivation, Maslow's hierarchy of Needs, Importance of Motivation in Childhood, Achievement motivation, Motivation in the classroom context. **(Hours: 13)**

UNIT - IV: INTELLIGENCE AND CREATIVITY
    Intelligence: Concept, Nature, Theories of Intelligence, Assessment of Intelligence, Multiple Intelligences – Emotional Intelligence. Creativity: Meaning, Definition, Process of Creativity, Factors foster creativity in children, Assessment of creativity.   **(Hours: 13)**

UNIT - V: PERSONALITY AND MENTAL HEALTH
    Personality: Meaning, Definitions, Concept. Theories of Personality: Assessment of Personality, Integrated Personality. Mental Health and Mental hygiene: Definition, Characteristics, Teachers Role in promoting Mental health in Children. Guidance and Counseling: Definition, Principles, Types. Teacher as a guide and counselor to children.

                                                                  (Hours: 12)

REFERENCES

1. Chauhan S.S, (2005). Advanced Educational Psychology 7th edition, vikas publishers house Pvt Ltd, Noida.
2. Dandapani, S. (2007), A text book of Advanced educational Psychology: Anmol Publications Pvt Ltd, New Delhi.
3. Kokila S. Thangasamy (2012). Child Development and Pedagogy, Manila Publications, Madurai.
4. Mangal, S.K. (2012) Advanced educational psychology, prentice hall of India, New Delhi.
5. Yogendra. K.Sharma, (2010). Textbook of educational psychology, Kanishka publications, New Delhi

SEMESTER V
18EDNU0505: TECHNO-PEDAGOGY

Credit: 4   **Max. Marks: 100**

Hours-64

Course Objective
To make the students know the objectives of Techno-Pedagogy

Special outcomes of Learning
The student will be able to
- Understand the nature and scope of educational technology
- Understand the System Approach to Education, Communication and its models
- Know the development of self learning materials.
- Develop the ability for critical appraisal of the audio visual media and instructional materials
- Know the recent innovations and future perspectives of Education Technology.
- Understand the electronic and Online Learning

UNIT – I: EDUCATIONAL TECHNOLOGY AND ICT IN EDUCATION
Educational Technology: Meaning and Concept – Definition – Objectives – Need – Scope and Limitations – Nature of Educational Technology – Components of Educational Technology – Approaches of Educational Technology. Information Technology: Meaning, Need. Information and Communication Technology: Meaning, Scope, Importance. Major Institutions of Educational Technology in India (NCERT, CIET, EMRC, SIET, UGC-CEC) and UNESCO ICT Competency Framework for Teachers.   **(Hours: 13)**

UNIT – II: CLASSROOM INTERACTION AND SELF INSTRUCTIONAL METHODS
Classroom Interaction: Meaning, Need, Importance – Techniques: Flander's Interaction Analysis Categories System. Self Instructional Methods: Auto Learning and Self Learning. Personalized System of Instruction (PSI) – Keller plan. Programmed Learning: Meaning, Definition, Objectives, Characteristics, Principles, Types and Steps. Computer Aided teaching techniques: CAI, CALL, CML – Advantages and Role of Teacher.

(Hours: 13)

UNIT – III: SYSTEM APPROACH AND COMMUNICATION
System Approach: Meaning, Concept, Characteristics, Components – Steps: System Analysis, Design and Development, Operation and Evaluation; Application of System approach to Classroom Instruction. Communication: Meaning – Concept – Types – Elements of Communications, Models of Communication, Barriers of Communication – Factors affecting Communication – Computer Mediated Communication (CMC). **(Hours: 12)**

UNIT – IV: MEDIA AND METHODS
Media: Meaning, Functions, Need, Types and Scope – Selection of Media for Teaching – learning and Social Media in Education. Multimedia Approach in Educational Technology: Meaning, Elements, Types, Uses, Tools for Creating Multimedia andadvantages of Multimedia. Audio Visual Media: Meaning Importance. Audio Visual Media: Meaning, Purpose, Importance, classification. C.C.T.V., Interactive Whiteboard, Educational

Television, Teleconferencing and Video conferencing. Teaching Methods: Brain Storming –Mastery Learning – Discovery Learning. **(Hours: 13)**

UNIT V ELECTRONIC AND ONLINE LEARNING

Electronic and Online Learning: E-learning, e-Learning Management System, e- Portfolio, e-GyanKosh, Sakshat Portal, Open Educational Resources (OER), E-content, , Web 1.0, 2.0, 3.0, 4.0, Educational blog, Smart Classroom, National Digital Library (NDL), Blended Learning, Flipped Learning, Virtual Classroom teaching, Cloud Computing in Education – Online learning: MOOCs, MOODLE, NME-ICT, SWAYAM, SWAYAM Prabha, ePG Pathshala, NPTEL and Spoken Tutorial. **(Hours: 13)**

REFERENCES

1. Aggarwal J.C., (2013). *Essentials of Educational Technology*. New Delhi: Vikas Publishing House.

2. Arulsamy S. and Sivakumar.P, (2002). *Application of ICT in Education*. Hyderabad: Neelkamal Publication.

3. Mangal.S.K and Uma Mangal.(2012).*Essentials of Educational Technology*. New Delhi: PHI Learning Private Limited.

4. Thiyagu.K & Arul Sekar.J.M.(2007). *Information and Communication Technology in Education.* Tiruchirappalli: Prophet Publishers.

5. Vanaja,M. and Rajasekar, S. (2010). *Educational Technology & Computer Education*. Hyderabad:Neelkamal Publication.

SEMESTER VI

18EDNU0606: CURRICULUM AND SCHOOL

Credit – 4   **Max.Marks: 100**

Hours – 64

Course objectives
To make the students understand the concepts of Curriculum and School

Specific Outcomes of Learning
The student will be able to

- Conceptualize the meaning and different perspectives of curriculum.
- Understand the philosophical, sociological and the psychological foundations of curriculum
- Understand the different types of curriculum with respect to their main orientation and approaches.
- Understand the need for and the components of curriculum development.
- Acquire knowledge about innovations in curriculum.
- To familiarize the National Curriculum Framework and Curriculum Evaluation

UNIT – I: INTRODUCTION TO CURRICULUM AND DEVELOPMENT

Meaning, Definition, Nature and scope of Curriculum – Need and Importance of curriculum Development – Basic principles – Structure of curriculum, Concept of curriculum development – Curriculum and Syllabus –.Role of Teacher in Curriculum development.

(Hours: 13)

UNIT – II: FOUNDATIONS OF CURRICULUM AND SCHOOL

Philosophical, Sociological, Psychological foundations of curriculum development – Selection of content: Criteria for selection of content or subject matter of curriculum – Reasons of inclusion and exclusion of a subject in school curriculum. **(Hours: 12)**

UNIT – III: CURRICULUM DESIGN

Types of curriculum Design – Subject centered – Learner centered – Problem centered — Hidden/Latent curriculum – Null curriculum –Social oriented – Humanistic curriculum - ABC Approach in curriculum: Articulation, Continuity and Balance. **(Hours: 13)**

UNIT – IV: INNOVATION IN CURRICULUM

Concept of Innovation and change – Factors influencing curriculum reform – Elements of change process – Preparation and use of resources units – Participation of pupils, teachers, administrators and education leaders – Barriers to change – Role of Technology: Challenges in Education – ICT Curriculum for Secondary Students: ICT Literacy and Application of ICTin Subject Area. **(Hours: 13)**

UNIT – V: NATIONAL CURRICULUM FRAMEWORK AND CURRICULUMEVALUATION

The salient features of National Curriculum framework (1998, 2000, 2005): Analysis of these documents with respect to various aspects of foundations, concerns, and the changes made with important considerations – Curriculum Reforms in India -Curriculum Evaluation: Objectives, Types and Criteria for curriculum evaluation - Models of curriculum evaluation: Tyler's, Rober E.Stake, Hilda Taba's and Sara model.   **(Hours: 13)**

REFERENCES

1. Aggarwal, J.C., (1990). Curriculum Reforms in India. Delhi: Doaba House.

2. Arulsamy, S., (2010). Curriculum Development., Neelkamal Publications Pvt,. Lted, Hyderabad

3. Hilda Taba, (1962). Curriculum Development Theory and Practice. New York: Marcourt Brace.

4. IGNOU, (1992). Curriculum Development for Distance Education, New Delhi

5. Sharma, R.A. (2005). Curriculum Development and Instruction. Meerut: R. Laal Book Depot,

SEMESTER VII
18EDNU 0701: LEARNER AND LEARNING

Credit - 4   **Max. Marks: 100**

Hours – 64

Course Objective
To Make the Students understand the Psychological concepts of the Learners and Learning
Specific Outcomes of Learning
The student will be able to
- Acquaint with the concept of learning and knowledge
- Understand various approaches to learning
- Identify concepts and constructs
- Know the factors contributing to learning
- Familiarize constructivist approach to learning

UNIT - I :LEARNING AND KNOWLEDGE
Active learner - Nurturing learners' active and creative activities. - "Is inform NCERT", children's voices and experiences - Integrating their Experiences with School Knowledge - Right to learn - Physical and emotional security for learning. Conceptual Development - Continuous Process - All children capable of learning - Important Aspects of Learning - Various ways of Learning - Cognitive readiness for learning - Learning in and outside the school - knowledge and understanding - Recreating knowledge - Manifesto for learning.

(Hours: 13)

UNIT - II: TYPES, LEVELS AND APPROACHES TO LEARNING
Types of learning - Learning Hierarchy - Signal learning stimulus - Response learning - Motor and verbal, chain learning - Multiple discriminations concept learning - Learning rules and problem - solving. Learning Levels from imprint to intuition - Examples of learning at different levels. Approaches - Behaviourist - Cognitivist and Constructivist. **(Hours: 13)**

UNIT - III: CONCEPTS AND CONSTRUCTS
Concepts and constructs – Concept – Formation - Use of materials activities, scheme pictures, real life experiences - Construct mental representations of external reality - Connecting ideas generated by students due to exposure to peers, media and community - Concept mapping.

(Hours: 12)

UNIT - IV: FACTORS CONTRIBUTING TO LEARNING
Personal Psychological, Social, Emotional factors and School related factors, Learning style; teaching strategies; media; technology in Teaching Learning Process - Teacher's personality traits. **(Hours: 13)**

UNIT - V CONSTRUCTIVIST APPROACH TO LEARNING
Learners construct knowledge for themselves - Constructing meaning is learning - Focus on the learner not on the lesson taught - Personal and social construction of meaning - Learning to Learn Making Meaning - Learning, a social activity – Zone of Proximal Development (ZPD). **(Hours: 13)**

REFERENCES

- Aggarwal J. C. (1996), Essentials of Educational Psychology, Vikas Publishing House Pvt. Ltd, New Delhi

- Mathur S. S. (2001), Educational Psychology, Vinod Pustar Mandir, Agra.

- Sanden Vander W. James (1989), Human Development, Refred A Knopg, INC. New York.

- Sprinthall, C., Richard and Sprinthall A. Norman (1990), Educational Psychology, A Developmental Approach. McGraw Hill Publishing Company, New York.

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- Onyehalu, A.S (1988). Psychological Foundations of Education. Meks-Unique (Nig.) Publishers, Awka.

18EDNU0702: COGNITIVE SCIENCE

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To Make the Students understand the basic concepts of cognitive science

Specific Outcomes of Learning
The students will be able to
* Acquire knowledge about basic concepts of Cognitive Science.
* Understand the role of brain in learning.
* Understand the role of emotion in learning.
* Identify the fundamental concepts of cognitive science.
* Know the challenges of cognitive science.

UNIT – I: BASICS OF COGNITIVE SCIENCE
Cognitive Science: Meaning, Definition, Scope. Fundamental concepts of Cognitive Science
- Artificial Intelligence – Knowledge Representation and Computation – Logic - Rules - Concepts – Images- Analogies. Connections - Information Processing. Branches of Cognitive Science: Cognitive psychology, Cognitive neuropsychology, Cognitive neuroscience, Application of Cognitive Science in Teaching and Learning. **(Hours: 13)**

UNIT – II: BRAIN AND LEARNING
Nervous system: Central Nervous system, Autonomous Nerous System, Structure of Brain and Neuron, Role of Neurons, Synapse, Electrical Activity, Event Related Poentials (ERP), Brain Mapping - Information Processing, Role of Neurotransmitters in learning - Brain Imaging techniques, Hemispherity and learning.   **(Hours: 13)**

UNIT – III: EMOTIONS AND LEARNING
Emotion: Definition, Meaning, Types: Positive and Negative Emotions - Role of Emotions in learning - Theories of Emotion – Philosophy of Mind – Differences between Mind and Brain – Different views on Mind – Role of emotions in Brain function – Different types of Relaxation Techniques for improving positive Emotions.   **(Hours: 13)**

UNIT – IV: COGNITIVE PROCESSES AND COMPUTATIONAL MODEL
Cognitive Skills: Meaning, Definition, types and their role in Learning – Attention, Perception, Memory, Language, Decision Making, Visual and Auditory recognition, Motor coordination, Creativity, Reasoning and Problem Solving - Computational Modelling – Neural networks - Cognitive architectures.   **(Hours: 12)**

UNIT – V: CHALLENGES IN COGNITIVE SCIENCE
Future of cognitive science - Research Methods in cognitive science- Cognitive Science Programs in India. - Reputed Cognitive Scientists in India and Abroad – Global view of Cognitive science –The role of Cognitive Science in empowering teachers. **(Hours: 13)**

REFERENCES

1. Paul Thagard. (2005). Mind Introduction to Cognitive Science. Second Edition – Prentice Hall of India New Delhi.

2. Srinivasan, N., Gupta, A.K., & Pandey, J. (2008). Advances in Cognitive Science: Volume 1. New Delhi, India: Sage Publications.

3. Srinivasan, N., Kar, B. R., & Pandey, J. (2010) *Advances in Cognitive Science: Volume 2*. New Delhi, India: Sage Publications.

4. Stephen K Reed (2007). Cognitive theories and Applications, New Delhi, Pearson Education Dorling Kindersley Publishing.

5. Ronald T Kellog (2007). Fundamentals of Cognitive Psychology, New Delhi, Sage Publications.

18EDNU 01O1: PEDAGOGY OF LANGUAGE ENGLISH – I

Credit - 4   **Max. Marks: 100**

Hours - 64 Course

Objective

To make the students know the principles of Pedagogy of English Language.

Special outcomes of Learning

The student will be able to

- Know about the concept of language.
- Familiarize with various approaches and methods of Language Teaching.
- Understand and train in the teaching of Prose, Poem, Grammar & Composition.
- Orient with evaluation of Language Learning.
- Develop proficiency in communicative skills.

UNIT – I: LANGUAGE

Language: Concept, Meaning, Definition, Nature, Function and Importance. Language Teaching: Principles, Aims and objectives. First Language Acquisition - Second Language Learning - Three Language formula – Language as a skill Subject – Role of CIIL, CIEFL, RIE in Strengthening Language Education. Language skill: LSRW, English as Second Language, Aims and Objectives, of Teaching English, Transfer from mother tongue- implications for Teaching methods, The rationale for learning English. **(Hours: 13)**

UNIT – II: APPROACHES AND METHODS OF SECOND LANGUAGE TEACHING

Approaches: Meaning and Definition. Structural, Situational Communicative Approaches. Methods: Grammar, Translation Method, Direct, Bilingual, Dr. West new method, Play-way, Silent – way and Suggestopedia. Differentiation between Approaches, Methods, Techniques and Strategies. Learning Difficulties in English and Remedies. Micro Teaching skills: Principles, introducing the lesson, Explanation, Black board usage, Reinforcement, Stimulus Variation, Questioning, Link lesson.
(Hours: 12)

UNIT – III: TEACHING OF PROSE AND POEM

Prose: Meaning, Characteristics. Objectives, Types, Steps and procedure in Teaching prose. Poem: Meaning, Characteristics. Principles, Aims Steps Procedure of Teaching Poem. Figures of Speech: Meaning, Rhyme and Rhythm, Alliteration and Pun, Simile and metaphor. Difference between Teaching of prose and poem. **(Hours: 13)**

UNIT – IV: TEACHING OF GRAMMAR, COMPOSITION AND SUPPLEMENTARY READER

Grammar: Definition, Characteristics, Types. Principles, Objective and methods of teaching. Composition: Meaning, Objectives, Principles, Types of Compositions: Controlled- Guided- Free, Kinds of Composition: Letter writing, Formal, Informal, Information, Business letters. Paragtaphy writing, Essay Writing, Precis writing, Oral Composition: Pair work. Methods of Teaching Composition, Supplementary Reader: Meaning, Characteristics, Objectives and methods of teaching.
(Hours: 13)

UNIT – V: EVALUATION OF LANGUAGE LEARNING

Evaluation: Meaning, Definition, Concept Need and Importance, Types of evaluation – Formative, Summative Tools of evaluation: The diagnostic test, the prognostic test, The Aptitude Test, The proficiency test, The Achievement test, Oral Tests, Written tests. Blue print: Meaning, Definition and Construction, Question bank.   **(Hours: 13)**

REFERENCES:

1. Adrian Doff, (2004). *Teach English: Cambridge teacher training and development*, Cambridge: Cambridge University press.

2. Begum Jahitha, A. (2010). *English Language Education*, Neelkamal Publications, Hyderabad.

3. Billows.F.L, (2001). *The techniques of Language teaching*, Longman, London.

4. Evangelin Arulsevi, (2012). Teaching of special English, Tamil Nadu Teacher Education University, Gowtra Agencies, Chennai.

5. Mowla sheikh, prabakar Rao, sarojini (2012). Methods of Teaching English, Neekamal Publications Pvt. Ltd. New Delhi, Hyderabad.

18EDNU 07O2: PEDAGOGY OF LANGUAGE TAMIL – I

Credit-4   **Max. Marks: 100**

Hours-64

Nehf;fk;;

khzth;fs; jkpo; nkhop fw;gpj;jypd; mbg;gil fUj;Jffis mwpa nra;jy;

rpwg;G fw;wy; milTfs;

* nkhopapd; gz;Gfis mwpjy;
* jha;nkhopapd; gy;NtW gapw;W Kiwfis mwpar;nra;jy;
* nra;As; ciueil ghlq;fisf; fw;gpj;jypd; NtWghLfis mwpjy;
* ,yf;fz gapw;wypy; cs;s jpwd;fis tsu;j;jy;
* Jizg;ghlk; kw;Wk; gy;NtW tifahd fl;Liug; ghlq;fis mwpar;nra;jy;.
* kjpg;gPlypd; El;gq;fis czHjy;

myF 1. nkhop

nkhop: nghHus;> tiuaiw> Nehf;fq;fs;> gad;fs;> gz;Gfs;. tiffs;: Ngr;Rnkhop> vOj;Jnkhop. mbg;gilj;jpwd;fs;;: Nfl;ly;> NgRjy;> gbj;jy;> vOJjy;. nkhopapd;jdpj;jd;ikfs.; jha;nkhop: tiuaiw> Nehf;fq;fs;> gad;fs;> rpe;jidfs; czu;r;rpfs; kw;Wk; mDgtk;> tsUk; fw;gidfspy; mofpay; Rit.

(Neuk;: 13)

myF 2. jha;nkhop gapw;W Kiw

rq;ffhy gapw;WKiw: FUFyKiw> nrhw;nghopT> ciuahly;> tpdhtpil gapw;rp> nel;LU Kiw. etPd Kiwfs;: tpisahl;L Kiw> ebg;G Kiw> jdpg; gapw;rp> Nkw;ghh;it gbg;G Kiw> nray;jpl;l Kiw> tphpTiu Kiw> fsMa;TKiw> tuyhw;W Kiw> jpl;lkpl;Lf; fw;wy;. GSkpd; tifghL: nghJ Nehf;fq;fs;> rpwg;G Nehf;fq;fs;. tiffs;: mwpT gFjp> czu;T gFjp> cs ,af;fg; gFjp> Ez;zpiyf; fw;gpj;jy; jpwd;fs; kw;Wk; ghljpl;lk;.

(Neuk;: 13)

myF 3. nra;As;> ciueil kw;Wk; ,yf;fzk; fw;gpj;jy;

nra;As;: nghHus;> tiuaiw> Nehf;fq;fs;> fw;gpf;Fk; Kiw kw;Wk; topKiwfs;. nra;As;eak; ghuhl;ly;;. ciueil: nghHus;> tiuaiw> Nehf;fq;fs;> fw;gpf;Fk; Kiw> nra;As; - ciueil NtWghLs;. ,yf;fzk;: tpsf;fk;> tiuaiw fw;gpj;jy; Nehf;fq;fs;;> gapw;W Kiw: tpjptUKiw> tpjp tpsf;f Kiw> tpisahl;L Kiwapy;> ,yf;fz; fw;gpj;jy;.

(Neuk;: 13)

myF 4. Jizg;ghlk;;> fl;Liu kw;Wk; nkhopngaHg;G fw;gpj;jy;

Jizg;ghlk;: tiuaiw> fw;gpj;jy; Nehf;fq;fs;> fw;gpj;jy; Kiw. fl;Liug; ghlk;: fw;gpj;jy; Nehf;fq;fs;> fw;gpj;jy; Kiwfs;. tiffs;: tho;f;if tuyhw;Wf; fl;Liu> tUzidf; fl;Liu> tpthjf;fl;Liu> tuyhw;Wf; fl;Liu> Ma;Tf; fl;Liu> ciuahly;; fl;Liu. (fPo;epiy> cau;epiy> Nky;epiy> tFg;GfSf;Fupad). nkhopngaHg;G: tpsf;fk;> tiuaiw Nehf;fq;fs;> gad; nkhopfspypUe;J jha;nkhopapy; nkhopngaHg;G> jha;nkhopapypUe;J gad; nkhopfspy;; nkhopngaHg;G> nkhopngah;g;ghy; vOk; rpf;fy;fs;> nkhopngaHg;G tiffs;.

(Neuk;: 13)

myF 5. kjpg;gPL

kjpg;gPLjy;;;: tpsf;fk;> tiuaiw> gad;fs;> Kiwfs;: cw;WNehf;fy;Kiw> tho;f;if JZf;Fg;gjpNtL> ahu;;vdCfpupj;jy;Kiw> Fwpg;gpLgl;bay;Kiw> Neu;fhzy;Kiw. Nju;Tfs;: jug;gLj;jg;ngw;wNju;Tfs;> ey;yNju;Tfs;ew;gz;Gfs;;;: ek;gfj;jd;ik> Vw;Gilik> Gwtaj;ghL> vspikj;ghL> gad;ghL> Fiwawpr;Nrhjid> FiwjPu;> Nrhjidfs;. jkpopy; milTj;Nju;T jahupj;jy;:: gbfs; - jpl;lg;glk; - tpdhj;jhs; - tpdhf;Nfl;lypd; ,d;wpaikahik>

tpdTjy; Nehf;fq;fs;> gad;fs;> tpdTk; Kiwfs;> rpwe;j tpdhf;fspd; rpwg;gpay;Gfs;.
(Neuk;: 13)

ghHit E}y;fs;:

1. fiyr;nry;tp. nt. (2009) jkpo; gapw;wy; El;gq;fs; rQ;rPtp gg;sprH]; > <NuhL.
2. NtZNfhghy; ,. gh. (1991) ige;jkpo; fw;gpf;Fk; Kiwfs; > rFe;jyh ntspaPL> NtY}H.
3. fzgjp. tp. (1997) ew;wkpo; fw;gpf;Fk; Kiwfs;> rhe;jh gg;sprH];> nrd;id.
4. nre;J}H ghz;bad; (1979) Ez;zpiyg; gapw;rp kPdhl;rp gjpg;gfk;> GJf;Nfhl;il.
5. NtZNfhghy; ,. gh rhe;jFkhhp (1991) nghJJ;jkpo; fw;gpj;jy; > rFe;jyh ntspaPL> NtY}H. kPdhl;rp Re;juk; (2013) ghlg;nghUs; kw;Wk; jkpo; fw;gpj;jy; (nghJJ; jkpo;)> fht;akhjhy; gg;spru;];> jpz;Lf;fy;.

18EDNU 07O3: PEDAGOGY OF MATHEMATICS – I

Credit – 4   **Max. Marks: 100**

Hours – 64 Course

Objective
To Make the Students understand the basic concepts of Pedagogy of Mathematics

Specific Outcomes of Learning
The student will be able to

- Acquire knowledge of the nature and scope of mathematics
- Understand the objectives of teaching mathematics
- Develop effective instructional skills and competency in structuring lesson plans.
- Apply the different methods and techniques of teaching mathematics.
- Know the various evaluation procedure.

UNIT – I: NATURE AND SCOPE OF MATHEMATICS
Mathematics: Meaning, definitions, and nature. Characteristics of mathematics: Logical sequence, structure, precision, abstractness, symbolism - Mathematics and its relationship with other disciplines – Contribution of eminent mathematicians: Ramanujam, Aryabhatta, Euler, Gauss.   **(Hours: 13)**

UNIT – II: OBJECTIVES OF TEACHING MATHEMATICS
Objectives of Teaching Mathematics: Bloom's Taxonomy. - Objectives of Teaching Mathematics at Primary, Secondary and Higher Secondary levels. - Values of teaching Mathematics - Objectives of teaching Mathematics with reference to NCF 2005 and NCFTE 2009. Instructional Vs Behavioural objectives of teaching Mathematics.   **(Hours: 13)**

UNIT – III: LESSON PLANNING
Developing Year Plans, Unit plans, Lesson Plans. Lesson Planning: Meaning, Definition, importance, Principles and steps. Herbation steps -writing and analysis of Lesson Plans. Problem solving skills and Micro and macro teaching skills for mathematics. **(Hours: 13)**

UNIT -   IV: METHODS OF TEACHING MATHEMATICS
Methods of teaching Mathematics: Analytic and synthetic, Induction and Deduction, Lecture method - Project method- Heuristic approach –Laboratory method- Dalton Plan – problem solving method. Modern methods of teaching Mathematics: Group discussion, Seminar, Team teaching, Cooperative learning, supervised study, Programmed Instruction, Computer Aided Instruction, Personalized System of Instruction.   **(Hours: 13)**

UNIT – V: EVALUATION IN MATHEMATICS TEACHING
Evaluation: Definition, need, importance. Tests and its types: Criterion and Norm referenced tests – Formative and Summative evaluation- Prognostic test -Diagnostic testing and Remedial teaching. - Principles of good mathematics test. Construction of standardized achievement test in Mathematics: Blue Print and question bank. Item Analysis- Reliability, Validity.   **(Hours: 12)**

PRACTICALS

- ❖ Collection of Biographic of different mathematics and history of symbols.
- ❖ Project on mathematics and its relationship with other disciplines.
- ❖ Preparing Lesson plans, Preparing A.V aids for respective lesson plans
- ❖ Developing micro teaching skills and practicing the skills in a class room situation
- ❖ Constructing achievement test for evaluation, evaluating the tool for achievement test.

REFERENCES

1. Aggarwal, J.C. (2008). Teaching of Mathematics. UP: Vikas Publishing House Pvt Ltd.

2. Aruljothi, (2013). Teaching of Mathematics – I, Centum Press, New Delhi.

3. Kulbir Singh, (2012). The Teaching of Mathematics, New Delhi: Sterling Publications.

4. Sharma, R. A., (2008). Technological foundation of education. Meerut: R. Lall Books Depot.

5. Bagyanathan, D. (2007). Teaching of Mathematics. Tamil Nadu, Text book society, Chennai.

18EDNU 07O4: PEDAGOGY OF PHYSICAL SCIENCE – I

Credit – 4   **Max. Marks: 100**

Hours – 64 Course

Objective

To make the Students gain knowledge of Pedagogy of Physical Science

Specific Outcomes of Learning

The student will be able to

- Learn the Nature and scope of physical Science.
- Understand the objectives of teaching Physical Science.
- Gain the skill of writing and analyzing lesson plans.
- Practice various methods of teaching Physical Science.
- know the various evaluation procedure in physical science teaching.

UNIT – I: NATURE OF PHYSICAL SCIENCE

Science: Meaning, Definition and Nature of Science – Structure of science. Importance of science. Training in the scientific method. Development of Scientific attitude and temper. Physical Science: Related areas of knowledge - Inter disciplinary approach. Impact of Physical Science on modern communities. Physical science for : Environment, Health, Peace, Equity; Physical sciences and society; Contribution of eminent scientists — Isaac Newton, Dalton, Neils Bohr, De Broglie, J. C. Bose, C. V. Raman, Albert Einstein, etc.   **(Hours: 13)**

UNIT – II: OBJECTIVES OF TEACHING PHYSICAL SCIENCE

Bases for the Formulation Objectives – Functions of objectives – Criteria for the selection of objectives - Bloom's Taxonomy - Objectives and values of Teaching Physical Science at Primary, Secondary and Higher Secondary levels. Objectives of teaching science with reference to NCF 2005 and NCFTE 2009. Instructional Vs Behavioural objectives of teaching Physical Science. **(Hours: 12)**

UNIT - III: LESSON PLANNING

Developing Year Plans, Unit plans, Lesson Plans. Lesson Planning: Meaning, Definition, Importance, Steps, Types and Format. Principles of Lesson Planning - Lesson Plans - Their importance - Herbation steps - Writing and analysis of Lesson Plans. Scientific skills and Micro and macro teaching skills for physical science.

(Hours: 13)

UNIT – IV: METHODS OF TEACHING PHYSICAL SCIENCE

General methods of teaching Physical Science: Scientific method, Induction and Deduction, Lecture method-Lecture cum demonstration method – Project method- Heuristic approach – Laboratory method - Historical and Biographical approaches, Dalton Plan. Modern methods of teaching Physical Science: Group discussion, Panel discussion, Simulation, Seminar, Workshop, Team teaching, Cooperative learning, supervised study, Programmed Instruction, Computer Aided Instruction, Personalized System of Instruction.

(Hours: 13)

UNIT – V: EVALUATION IN PHYSICAL SCIENCE TEACHING
Evaluation: Definition, Need, Importance. Tests and its types: Criterion and Norm referenced tests – Formative and Summative evaluation - Prognostic test - Diagnostic testing and Remedial teaching. - Principles of good science test. Construction of standardized achievement test in physical science: Blue Print and question bank. Item Analysis- Reliability, Validity.   **(Hours: 13)**

REFERENCES
1. Gupta S.K.(2012), Teaching of Physical Science in Secondary Schools, sterling Publications.

2. Nair, C.P.S, (2010), Teaching of Science in our Schools, Sulthan Chand & Co ltd.

3. Panner Selvam, A., (2013), Rajendran.k. Teaching of Physical Science, Shantha Publishers. Chennai.

4. Sivarajan K. (2012), Trends and developments in Modern Educational Practices Calicut University.

5. Radha Mohan (2011), Teaching of Physical Science, Neelkamal Publications PVT. LTD, Hyderabad.

ELECTIVE
18EDNU07E1: ASSESSMENT AND EVALUATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the students explore the methods of Assessment and Evaluation in education.

Specific Outcomes of Learning
The student will be able to

- grasp the basic principles of educational measurement and evaluation
- acquaint with concepts of Educational Assessment
- develop skills and competencies for test construction
- know the principles of Standardisation of Tests
- understand the process of Continuous And Comprehensive Evaluation.

UNIT – I: MEASUREMENT AND EVALUATION IN EDUCATION
Measurement: Meaning, definition, importance, Purpose, Types. Evaluation: Meaning, Concept, Importance, and Functions. Role of evaluation in teaching – Learning process. Measurement Vs Evaluation. Formative and Summative evaluation. **(Hours: 13)**

UNIT- II: INTRODUCTION TO EDUCATIONAL ASSESSMENT
Educational assessment: Meaning, definition, Purpose, Applications and types. Trends in educational evaluation: Internal assessment, Grading, Semester system, Question bank, Computers in evaluation.
(Hours: 12)

UNIT – III: TEST CONSTRUCTION
Test: Meaning, Definition, Importance and Characteristics -Teacher made test and standardized test - Test construction: Principles, Steps, Planning and Designing. - Preparation of Blue print - Writing test items: objective types and Subjective types. Norm Reference Test (NRT), Criterion Reference Test (CRT).   **(Hours: 13)**

UNIT – IV: STANDARDISATION OF TESTS
Characteristics of good Test: Validity, Reliability, Objectivity, Usability and Norms - Item analysis: Objectives, Steps, Factors, Discrimination power and difficulty index - Standard scores: Meaning and importance. Conversion of raw scores in to 'z' and 'T' scores,Percentiles.   **(Hours: 13)**

UNIT – V: CONTINUOUS AND COMPREHENSIVE EVALUATION (CCE)
Continuous And Comprehensive Evaluation: Aim, Objective, functions and Characteristics– Scholastic areas – Co-Scholastic areas – Recording and Reporting of student's achievements
– Students feedback mechanism.   **(Hours: 13)**

REFERENCES

1. Cohen, Jay, Ronald et al, 2005, Psychological Testing and Assessment and Introduction to Tests and Measurement, Mayfield publishing Company, California.

2. John W. Best(2008), Research In Education, printice hall of India Pvt.Ltd, New Delhi

3. Nagarajan. K, Research methodology in Education, 2012, Ram Publication, Chennai

4. Rawat, D.S, (2009), Measurement Evaluation and Statistics in Education, New Raj Book Depot, New Delhi.

5. Ved Prakash, et.al. (2000): Grading in schools, NCERT, Published at the publication Division by the secretary, NCERT, Sri Aurobindo Marg, New Delhi.

18EDNU07E2: GUIDANCE AND COUNSELLING

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective

To make the students appraise the concepts of Guidance and Counselling.

Specific Outcomes of Learning

The student will be able to

- appraise the concept and principles of guidance and counseling
- organize school guidance and counselling service
- develop skills in rendering guidance and counselling to students
- study the recent trends in guidance and counselling programme
- acquaint with the guidance and counselling programme for special groups.

UNIT – I: INTRODUCTION TO GUIDANCE

Nature, principles, purpose of guidance - Guidance an integral part of education – Historical development of guidance and counseling movement - Types of guidance – scope andfunctions of educational, vocational, personal, and social guidance. Need and scope of groupguidance, activities for organizing group guidance services in educational institutions.

(Hours: 13)

UNIT - II: PRINCIPLES AND PRACTICE OF COUNSELLING

Meaning, Definition, Nature and principles of counseling. Approaches to counseling: Directive, Non - Directive, Eclectic - Characteristics, Role and functions of counsellor - Counsellor as career master, professional preparation of counsellor - Teacher as a counsellor.   **(Hours: 12)**

UNIT - III: TECHNIQUES OF COLLECTING INFORMATION FOR GUIDANCE

Testing techniques – Types of tests used in guidance - Tests of intelligence, aptitude, interest, achievement and personality – Strengths and limitations of testing techniques in guidance - Non-testing techniques – Observation, Questionnaire, Rating Scale, Interview, Anecdotal record, Cumulative record, and Case study.   **(Hours: 13)**

UNIT - IV: GUIDANCE SERVICES

Types of school guidance programme: Educational, Occupational guidance, Personal, Socialguidance and Placement service. Organization of group guidance programme. Remedial services and role of the counselor. Evaluation of guidance programme. **(Hours: 13)**

UNIT - V: GUIDANCE FOR SPECIAL GROUPS

Special emphasis on guidance for Gifted children, Slow learners, Differently abled children including Orthopedically handicapped, Visually disabled, Deaf and dump, Maladjusted and Juvenile delinquents. Recent trends of research in guidance and counseling in India.

(Hours: 13)

REFERENCES

1. Crow & Crow, (1992), An introduction to Guidance, Eurasia Publishing House, ND.

2. Freeman E.S, (1995), Theory and Practice of Psychological Testing, ND: Henry Holt.

3. Jones. A.J. (1970), Principles of Guidance, Mc Grew Hills Publishers, New Delhi.

4. Kochar, S.K. (1990), Educational and Vocational Guidance in Secondary Schools, Sterling Publishers, Pvt. Ltd, New Delhi.

5. Super D.R, 1960), The psychology of Careers, Harrer, New York.

6. Rao, S Narayana, (2008), Counselling and Guidance, Tata McGrew Publishing Company Ltd, New Delhi.

18EDNU07E3: HEALTH AND YOGA EDUCATION

Credit-4   **Max.Marks:100**

Hours-64

Course Objective
To make the students Orient with the concepts of Health and Yoga Education

Specific Outcomes of Learning

The student will be able to

- Orient on the Physical Education and Health Education
- Acquire knowledge about yoga and physical exercises.
- Create awareness on different aspects of health and fitness.
- Develop skills in organizing the physical education programmes in schools
- Study the principles of health and health education
- Understand the curriculum planning and Practice of health education
- Practice yoga, asanas, Pranayama and Meditation

UNIT - I: INTRODUCTION TO HEALTH AND PHYSICAL EDUCATION

Meaning and definition of Health - criteria of health - Importance of Health - Positive Health –-Various dimensions of health - Meaning and definition - Physical Education: Implications, Aims and Objectives - Foundations of Physical Education: Physical Fitness, Physical Education and sports fitness - Development of Physical, Cognitive, Neuromuscular, Affective, Social, Emotional, Spiritual and Recreational - Physiological Effects of Exercise, Growth and development - Brain and Physical Education.   **(Hours: 12)**

UNIT – II: PHYSICAL EDUCATION PROGRAMMES IN SCHOOLS

Organization of Physical Education programmes in secondary schools - Methods of teaching physical activities - Competitions – their role, values and limitations - Team and House System - Preparation of Fixtures - Organization of Annual sports Meet - Organisation of Intramural and Extramural Competitions - Basic Games Rules and Measurements: Kabaddi, Kho-Kho, Volley Ball – Badminton - Minor games - Evaluation of physical education programmes.   **(Hours: 13)**

UNIT – III: PRINCIPLES OF HEALTH AND HEALTH EDUCATION

Health Education - Scope of Health Education - role of International health Organizations (WHO, UNICEF), Principles, Need and Importance – cause of ill health - Diseases: Communicable Diseases, Infectious Diseases and Deficiency Diseases. Cleanliness and Personal Hygiene - Positive Mental Health – Counseling against use of artificial stimulants (Alcohol, Smoking and drug abuse) - Food and Nutrition – Balanced diet – value of nutrition
- Safety Education and First Aid.   **(Hours: 13)**

UNIT - IV: PLANNING AND PRACTICE OF HEALTH EDUCATION

Health Instruction, Health Services, Importance with reference to rural Schools, School Health Education: Curriculum Planning, Need and Importance, Principles, Planning,

Implementation of School Health Education Programme - Health Instruction, HealthAppraisal, Health Service and Health Counseling - Teacher's role and responsibilities.

(Hours: 13)

UNIT – V: YOGA AND MEDITATION

Yoga: meaning, definition, need and importance, different schools of yoga, eight limbs of yoga. difference between yoga and physical exercise - Yogic principles of healthy living – guidelines for practicing asanas - Cultural asanas - Meditative asanas – Relaxative asanas, Pranayama - Mudras - meditation: meaning, definition, types of meditation, mantra meditation, object meditation, breathing meditation, walking meditation and gandhian way of meditation/silent meditation, therapeutically value of meditation. effect of yogic practices on respiratory and circulatory system - brain and yoga.

(Hours: 13)

PRACTICALS

1.Padmasana 2. Yoga mudra 3. Trikonasana 4. Utkatasana 5. Vajrasana 6. Bhujangasana 7. Suriya Namaskar 8. Nadishodhan

REFERENCES

1. Anil Sharma, (2004), *Sports Laws*, Khel Sahitya Kendra,.

2. Grace Nirmala. D., & Dr.T.Krishnammal. T. (2007), *Physical Education and Health Education*, Priyakamal Publication.

3. Basavaraddi, I.V. (ed.) (2010). *Yoga Teacher's Manual for School Teachers*. Delhi: Morarji Desai National Institute of Yoga.

4. Swami Satyananda Saraswathi, (1997), *Asana Pranayama Mudra Bandha*, Bihar: Toga.

5. Om Prakash Tiwari, (2002), *Asana-Why and How*, Lonavla: Kaivalyadhama.

18EDNU07E4: VOCATIONAL EDUCATION AND TRAINING

Credit – 4   **Max. Marks: 100**

Hours – 64 Course

Objective
   To make the Students gain knowledge and skills in Vocational Education and Training
Specific Outcomes of Learning
   The student will be able to
- acquire knowledge of the various aspects of vocational education.
- study the role of vocational education in increasing productivity.
- develop proper attitude towards vocational education.
- provide judicious mix of skills relating to a profession and appropriate content of General Education.
- study the salient features of organizations
- give vocational training and entrepreneurship skills.

UNIT – I: VOCATIONAL EDUCATION: CONCEPT AND NEED
   Concepts of vocational and technical education – Need and importance. Vocational Education for Human resources development – Vocational education and economic development - Relation of general, Technical and vocational education – Technical Vocational education in school curriculum.
                                                                                (Hours: 13)

UNIT – II: VOCATIONAL EDUCATION AT SECONDARY STAGE
   Objectives, Course of study - List of vocations – Syllabus, scheme of examination – Qualification and training of teachers for vocational education. Major areas of vocational education. Problems of vocational education - Suggestions for improvement.**(Hours: 13)**

UNIT - III: VOCATIONAL EDUCATION PROGRAMMES
   Work Experience – Concept – Distinction between work experience and vocational education. Basic education – concept – merits – criticism, need and importance, Scheme of multipurpose schools. S.U.P.W. – Concept – Objectives – Selection of activities programme
– Types of activities and their advantages.   **(Hours: 13)**

UNIT – IV: TECHNICAL INSTITUTIONS
   ITI and Polytechnic – Need and importance – Classification, admission process – Course of study – organization and administration at state level, – Administrative methods of Vocational Training – vocational guidance – need and importance-vocational fitness and appraisal-Recent trends in technical education.   **(Hours: 13)**

UNIT – V: OCCUPATIONAL TRAINING
   Salient features and co-operation with industries and other organizations. Vocational education and training, Self employment policies – training for self employment and small scale village industry. Vocational Trades and Training – Food processing-Bakery, Handmade paper – Textiles, Khadi and Handloom, Cottage Industries – Diary – Agri – Handicrafts – Herbal products – Painting – Construction – Leather Works.   **(Hours: 12)**

REFERENCES

1. Aggarwal J.C.Aggarwal S.P, (1987), Vocational Education, Doaba House Publishers, New Delhi.

2. Dhirendra Verma, (2001), Administration of Vocational Education, Concept Publication, New Delhi.

3. Kothari Commission report, (1964-66). Ministry of Education, New Delhi.

4. Ministry of Human Resource Development, (1986), National Policy on Education, Govt. of India, New Delhi.

5. Vanaja Rao, (1997), Inquiry training model, DPH, New Delhi.

18EDNU07E5: AESTHETIC AND CREATIVE EDUCATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course objective
To Make the Students know the aspects of Aesthetic and Creative Education
Specific Outcomes of Learning
The student will be able to
- understand the traditional Indian music and performing arts.
- acquire knowledge about the classification of Indian music and performing arts.
- develop the basic skills for teaching music and performing arts.
- prepare educational strategies for aesthetic and creative education
- evaluate the performance of students.

UNIT - I: AESTHETIC EDUCATION
Concept, Meaning and Importance of Aesthetic Education- Indian Music and Performing arts-Musical traditions in Tamilnadu (Karnatic, Folk and Tamilisai) - Tradition of Performing arts (Bharathanatiyam and Folk dances). Meaning and Concept of Arts Education-Visual Arts, Performing Arts and its significance at elementary level of school education.

(Hours: 13)

UNIT – II: METHODS AND TECHNIQUES
Music Education and Methods - Meaning, Raga, Tata, Instruments-technical terms in Karnatic music for teaching- facial expression, foot-steps, mudras, postures in Bhrathanatiyam for teaching performing arts like story-telling, demonstration, dramatics (Social oriented, History oriented etc.,) Play way method.   **(Hours: 13)**

UNIT – III: TEACHING AIDS FOR INSTRUCTIONS
Developing composing skill of a music teacher-Techniques for composing- poems, rhymes, hymns etc. Planning of art experience for elementary class. Organization of material and space of art experience. Organisation and facilitation for art experience at elementary level.

(Hours: 13)

UNIT – IV: CREATIVE TEACHING
Creative Teaching Conceptand Meaning. Teaching strategy for creative education. Teaching through music and performing arts-music in different grades. Aims and objectives of teaching music and performing arts. Role of a music teacher in school activities. Aids for teaching music and performing arts.   **(Hours: 13)**

UNIT – V: ART EVALUATION
Nature and scope of art evaluation. Art evaluation-meaning, significance. Tools for art evaluation. Art curriculum at different stages as suggested by massive teacher orientation programme organized by NCERT.   **(Hours: 12)**

REFERENCES

1. Bhawna Misra, (2002), Art, Craft and Physical Education, Mohit publications, New Delhi.

2. Chelladurai,P.N, (1998),Thinnaga Isayeyal, Vaikarai Pathipagam, Dindigul.

3. Dash B.N, (2002), Teacher and Education in the Emerging India Society (Vol. I & II) Neelkamal publications, New Delhi.

4. Gowri Kuppusamy, (1980), Teaching of Music, Sterling publishers, New Delhi.

5. Rupali Tripathi, (2004), Teaching of music, Mohit Publication, New Delhi.

18EDNU07E6: GENDER ISSUES IN EDUCATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the students Understand the aspects of Gender Issues in Education

Specific Outcomes of Learning
The student will be able to
- Develop basic understanding and familiarity with key concepts–gender, gender bias, gender stereo type, empowerment, gender parity, equity and equality, patriarchy and feminism.
- Understand the gradual paradigm shift from women's studies to gender studies and some important landmarks in connection with gender and education in the historical and contemporary period.
- Learn about gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, religion and region.
- Understand how gender, power and sexuality relate to education. (in terms of access, curriculum and pedagogy).

UNIT – I: INTRODUCTION TO GENDER ISSUES
Gender, Sex, Sexuality, Patriarchy, Masculinity and Feminism. Gender bias, gender stereotyping, and empowerment. Equity and equality in relation with Caste, Class, Religion, Ethnicity, Disability and Region.   **(Hours: 13)**

UNIT – II: GENDER STUDIES - PARADIGM SHIFTS
Paradigm shift from women's studies to gender studies. Historical backdrop: Some landmarks from social reform movements of the nineteenth and twentieth centuries with focus on women's experiences of education. Contemporary period: Recommendations of policy initiatives commissions and committees, schemes, programmes and plans.

(Hours: 12)

UNIT – III: GENDER, POWER AND EDUCATION
Theories on Gender and Education: Application in the Indian Context - Socialization theory - Gender difference - Structural theory - Deconstructive theory. Gender Identities and Socialisation Practices in: Family – Schools, Other formal and informal organization. Schooling of Girls: In equalities and resistances (issues of access, retention and exclusion).

(Hours: 13)

UNIT - IV   GENDER ISSUES IN CURRICULUM
Gender, Culture and Institution: Intersection of Class, Caste, Religion and Region Curriculum and the gender question. Construction of gender in curriculum framework since Independence: An analysis Gender and the hidden curriculum. Gender in text and context (textbooks' inter-sectionalist with other disciplines, classroom processes, including pedagogy)
.Teacher as an agent of change .Life skills and sexuality.   **(Hours: 13)**

UNIT - V   GENDER, SEXUALITY, SEXUAL HARASSMENT AND ABUSE

Linkages and differences between reproductive rights and sexual rights. Development of sexuality, including primary influences in the lives of children (such as gender, body image, role models). Sites of conflict: Social and emotional. Understanding the importance of addressing sexual harassment in family, neighbourhood and other formal and informal institutions. Agencies perpetuating violence: Family, school, work place and media (print andelectronic). Institutions redressing sexual harassment and abuse.   **(Hours: 13)**

PRACTICAL:

Quiz, Debate, Group Discursion, Assignment, Field Visit.

REFERENCE

1. Ram Shankar Singh, (2009), Encyclopedia on women and children Trafficking – Volume 1 to 3- Anmol Publications.

2. Nalini Mishra, (2008), Woman Laws against Violence and abuse- Pearl Books –New Delhi.

3. Manju Gupta, (2006), Handbook of Women Health - Khel Sahitya Kendra – New Delhi.

4. Nirmala Jayaraj, (2001), Women and Society – Lady Doak College Madurai 625002.

5. Indira Kulishreshtha 'Noopur' (1989), Women's Studies in School Education- Sterling Publishers private limited.

COMPULSORY NON CREDIT COURSE

18EDNU08F1: REMEDIAL TEACHING IN RURAL SCHOOLS

- B.Ed Students go to Rural Schools for a period of five days and do the following assignments. Identification of slow learners subject wise

- Identification of Remedial Teaching for slow learners

- Identification of problem students" Identification of Counselling problem students

- Identification of learning difficulties of students

- Improving English language skills

- Conducting health and hygiene awareness programmes

SEMESTER VIII

18EDNU0812: ELEMENTS OF INCLUSIVE EDUCATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective

 To make the students familiarize with basic aspects of Inclusive Education

Specific Outcomes of Learning

The student will be able to

- Enable the students to understand the concept, need, importance and emerging trends in the education of students with special needs.
- Provide adequate knowledge and skills about the causes, characteristics, identification and assessment of students with special needs.
- Orient the teacher trainees in planning, development and implantation of different educational programmes to the students with special needs.
- Develop deeper understanding and skills in the teacher trainees in the promotion of inclusive education practices to differently abled students in regular schools.

UNIT – I: CONCEPT OF SPECIAL EDUCATION

Special Education: Concept, Meaning and Definition - Need for Special Education in India-Differences between Disability, Impairment and Handicap - Difference between Segregated Education, Integrated Education, Mainstreaming and Inclusive Education-A brief History of Special Education programmes in India. Govt. Policies and Legislations: Recommendations given in NPE 1986, POA 1992 and PWD Act 1995 with special reference to people with Disabilities/Special needs-Role of National Institute: NIMH, AIISH, AYJNISH, NIOH, NIMD, NIVH and RCI in the promotion of Special Education in India.

(Hours: 13)

UNIT – II : VISUAL IMPAIRMENT

Visual Impairment: Concept, Meaning and Definition - Categories, Causes and Characteristics Visually Impaired Children – Identification and Assessment - Education of Visually Impaired Children - Teaching Visually Impaired in regular classroom.

(Hours: 13)

UNIT – III: SPEECH & HEARING IMPAIRMENT

Speech and Hearing Impairment: Nature-Types-Causes –Identification and Assessment- Education Provisions for Speech and Hearing Handicapped- Teaching Speech and Hearing Impaired in regular classroom.   **(Hours: 12)**

UNIT – IV: MENTAL RETARDATION AND EMOTIONAL & BEHAVIOR DISORDERS

Mental Retardation: Concept, Meaning and Definition of Mental Retardation - Causes, Types, Characteristics and Identification of Mentally Retarded - Education Provisions for Mentally Retarded Children - Teaching Mentally Retarded children in regular classrooms. Emotional and Behavior Disorders: Concept, Meaning and Definition Characteristics, Causes and Identification of Emotional and Behavior Disorders - Educational Programmes for Children with Emotional and Behavioral disorders teaching the Emotional and Behavior disordered children in general classrooms. **(Hours: 13)**

UNIT – V: LEARNING DISABILITIES AND GIFTEDNESS

Learning Disabilities Concept, Meaning and Definition - Causes, Characteristics and Identification of Learning Disabilities in Children -Teaching Learning Disabled children in regular classroom. Giftedness: Concept, Meaning and Definition- Characteristics, Identification and Education for Gifted Children. **(Hours: 13)**

REFERENCES

1. Agarwal,R& Rao, BVLN. (2010). Learning disabilities teaching learning Strategies. Shipra Publications, New Delhi.

2. ChintamaniKar (2003): Exceptional Children. Their Psychology and Education Sterling Publishers.

3. Dhawan.M.L. (2005).Learners with Special Needs. Mehta offset press, New Delhi.

4. Narayan.J., (2003). Educating children with learning problems in regular schools. Secundrabad: NIMH.

5. Dr.Manju Gupta, (2007), "Special Education", KSK Publishers and Distributors, New Delhi.

18EDNU0813: SCHOOL MANAGEMENT, LEADERSHIP AND ACTION RESEARCH

Credit – 4   **Max. Marks: 100**

Hours – 64 Course

Objective

To make the students know the aspects of School Management, Leadership and ActionResearch

Specific Outcomes of Learning

The Students Will be able to

- acquire knowledge about the role of educational Planning at different levels
- understand the meaning, scope and various levels of educational Administration
- sensitize the pupils towards the need for Educational management
- familiarize the concept of School Administration And Organisation
- explore various dimensions of Action research

UNIT – I: EDUCATIONAL PLANNING

Educational Planning: Meaning, Definition, Need, Objectives. Education in Five year plan - Different levels of Educational Planning: Long term plan, Short term plan. – Institutional Planning: Meaning, Definition, Steps, Need and Characteristics.   **(Hours: 13)**

UNIT – II: EDUCATIONAL ADMINISTRATION

Educational Administration, Educational Supervision: Meaning, Definition, Principles and Importance. National and State level Advisory Bodies: CABE, SCERT, UGC, RCI, NUEPA, NCERT, NCTE.   **(Hours: 13)**

UNIT – III: EDUCATIONAL MANAGEMENT

Educational Management: Meaning, Definition, Objectives, Administration Vs Management.
- Functions of Management: Planning, Organization, Direction, Staffing, Co-ordination, Reporting, Budgeting (PODSCORB). Theories of Management: Taylor's Scientific Management, Max Weber's theory   **(Hours: 13)**

UNIT – IV: SCHOOL ADMINISTRATION AND ORGANISATION

School Organization: Meaning, definition, importance, and Principles. School and community, Quality in education: Meaning, Definition, indicators and importance. Role of supervisor: CEO, DEO.DEEO, AEEO, VEC, PTA. Total Quality Management in Education (TQM).   **(Hours: 13)**

UNIT – V: ACTION RESEARCH

Action Research: Meaning, Definition, Nature, Scope and Principles. Selecting problems for action research. Steps in action research. Teacher as action researcher. Examples for action research. Reporting action research.   **(Hours: 12)**

REFERENCES

1. Dash B.N, (2011). School organization administration and management, Neelkamal Publications, New Delhi.

2. Joshi Shekar, (2014). Educational Planning, Pacific Books International, New Delhi.

3. Laxmi Devi, (1998), Educational Planning, Anmol Publications, New Delhi.

4. Mohanty, Jagannnath. (2008), Educational Management Supervision-School organization,   Neelkamal Publications, New Delhi.

5. Pandya S.R. (2008), Administration and Management of Education. Himalaya Publishing,

18EDNU 08O1: PEDAGOGY OF LANGUAGE – ENGLISH II

Credit -4   **Max. Marks: 100**

Hours – 64 Course

Objective

To make the students orient with pedagogy of language English

Specific Outcomes of Learning

The student will be able to

- Acquire Language Skills
- Orient with various teaching resources & language teacher's competencies
- Understand about lesson plan and text books
- Understand the recent trends of language Teaching

UNIT - I: LISTENING COMPREHENSION AND SPEAKING SKILLS

Listening skills: sub skills of listening, listening for Perception and comprehension, three phases of listening activities, Problems in teaching listening and Suggestions to improve listening- Speaking skills: sub skills of speaking, Techniques in teaching speaking - the conversation class, topic based discussion class - Task centred fluency practices. Tasks for developing speaking skill: individual, pair and group work. Improving speaking skills: Parallel sentences, Conversation, Dialogues, Role play, Dramatisation, Play Reading, Group Discussion, Storytelling, Narration, Description, Games, Debate, Interview, Extempore Speech. Barriers to Effective Communication.   **(Hours: 13)**

UNIT - II: READING COMPREHENSION AND WRITING SKILLS

Reading skills: Meaning, Aims, Importance, Stages of Reading, Types of Reading – Skimming, Scanning, intensive and Extensive reading, Loud and Silent reading. Methods of teaching Reading: Alphabet method, Phonetic Method, Word method, Phrase method, Sentence Method, Reading for perception and Reading for Comprehension. Strategies to develop oral reading and Silent reading. Testing Reading. Writing Skills: Grammatical skills, Judgemental skills, Discourse skills, Mechanical skills, Characteristics of good handwriting, Strategies for developing good handwriting. Note making, Note taking, summarizing, paraphrasing, elaborating, content writing, script writing and editing.
                                                                                                              (Hours: 13)

UNIT - III: RESOURCES AND INSTRUCTIONAL MATERIALS FOR TEACHINGOF ENGLISH

Meaning and importance of TLM, Zero Cost and Low cost TLM. Types of Resources (TLM): Audio resources - Audio cassette, Radio broadcast, tape recorder, Language Laboratory, Linguophone. Visual resources- Black board, charts, pictures, flash cards, models cartoons, OHP. Audio visual resources- Films, videocassettes, computers, T.V, CAL Programmes. use of website. Literary Activities- Debate, Dramatics, symposium, Declamations, Quiz, elocution. Teacher as a human resource: Qualities, Qualification and Competencies of English teacher. Avenues for professional growth. Creating global teachers- IELTS, TOFEL.
                                                                                                              (Hours: 13)

UNIT - IV: PLANNING AND TEXT BOOK IN ELT

Lesson plan- meaning, aims, Objectives, importance and steps, Advantages of lesson plan, Characteristics of lesson plan, Micro and Macro lesson plan, Portfolio of writing. Model lesson plan for prose, poetry, grammar, composition and vocabulary. Text Books: Meaning. Definition, importance and characteristics of good text book. Supplementary reader, Reference material, Work book.   **(Hours: 12)**

UNIT V: RECENT TRENDS IN LANGUAGE TEACHING

Computer Assisted Language Learning (CALL), Community Language Learning (CLL), Total Physical Response (TPR), Task Based Language Teaching (TBLT), Co-operative Learning, On-line Learning, Multimedia, English for Specific Purpose (ESP), Web-based Learning, Role of Internet in Language Teaching.   **(Hours: 13)**

REFERENCES

1. Baruah, T.C. (1993). The English Teacher's Handbook, New Delhi: Sterling Publishers.

2. Chauhan, S.S. (2008). Innovations in Teaching Learning Process. UP: Vikas Publishing House Pvt. Ltd.

3. Meenakshisundaram, (2008). Teaching of English (Optional I &II). Dindigul: Kavyamala Publications.

4. Siddiqui, (2009). Techniques of Classroom. New Delhi: APH Publishing Corporation.

5. Thangasamy Kokila, S. (2014). Innovations in the teaching of English. Gandhigram: Anicham Blooms.

18EDNU08O2: PEDAGOGY OF LANGUAGE - TAMIL II

Credit-4 **Max. Marks: 100**

Hours-64

Nehf;fk;

khzth;fs; jkpo; nkhop fw;gpj;jypd; mbg;gil fUj;Jffis mwpa nra;jy;

rpwg;G fw;wy; milTfs;

- jkpo; fw;gpj;jypy; gy;NtW jpwd;fspy; gapw;rp ngWjy;;
- Nfl;Lzu;jy; jpwidAk;> nghUSzu;jy; jpwidAk; tsu;j;jy;;
- rpwe;j vOj;jhw;wiy tsu;j;jy;;> gy;NtWtifahd eilNtWghLfis mwpar;nra;jy;;
- ghlE}ypd; gz;Gfis mwpjy;;
- nkhopf;fw;gpj;jypd; El;gf;$Wfis mwpjy;;

myF 1 – Nfl;ly; jpwd;

Nfl;ly;: tiuaiw> Nfl;ly; jpwid tsu;j;jYf;fhd Nehf;fq;fs;> **topKiwfs;:** thndhypf; Nfl;ly;> xypg;gjppTf; Nfl;ly;;> fijf;$wy;> tpLfijfs;> Gjpu;fs; Nfl;ly;> RUf;fpnaOJjy;> ghlg;gFjpfisg; gbj;J tpdhf; Nfl;ly;> Nfl;lypd; topf; fw;wy;;.

NgRjy;: tiuaiw> Nehf;fq;fs;> gad;fs;> jpUe;jpa Ngr;rpd; nghUe;jpa ey;ypay;Gfs;. jpUe;jpa Ngr;rpid tsu;f;f JizahFk; ,yf;fpaq;fs;: ehlfq;fs;> nrhw;Nghu;> fye;Jiuahly;>tpdhb tpdh> ,yf;fpa kd;wq;fspy; NgRjy;> kdg;ghlk; nra;jy;;. cr;rupg;gpy; Vw;gLk; rpf;fy;fs;> **gapw;rpfs;:** ehnefpo;g; gapw;rp> ehg;gpwo;g; gapw;rp> %r;Rg; gapw;rp.

(Neuk;: 13)

myF 2 – NgRjy; jpwd;

gbj;jy;: Nehf;fq;fs;> njhlhpf;f tFg;gpy; gbf;ff; fw;gpf;Fk; Kiwfs;: vOj;J Kiw gbg;G> nrhy; Kiw gbg;G> nrhrw;nwhlu; Kiw gbg;G> epiw - Fiwfs;. **gbf;Fk; Kiwfs;:** nrhw;fsQ;rpag; ngUf;fk;> tha;f;Fs; gbj;jy;> gbj;jy;> tha;tpl;Lg; gbj;jy;> **tiffs;:** mfd;w gbg;G> Mo;e;j gbg;G - Nehf;fq;fs; - epiw - Fiwfs;.

vOJjy;: **ey;y ifnaOj;jpd; ey;ypay;Gfs;:** njspT> msT> moF> ,ilntsp> tpiuT. vOj;Jg; gapw;rp Kiwfs;: tupnahw;wp vOJjy;> ghu;j;J vOJjy;> nrhy;tij vOJjy;. gpioapd;wp vOjg;gapw;rp jpy; - gpiofs; Njhd;wf; fhuzq;fs; - gpiofisf; fisAk; Kiwfs; - epWj;jw;Fwpfisg;gad;gLj;Jjy; - typ kpFk; ,lk; - kpfh ,lk;.

(Neuk;: 13)

myF 3 - nkhopahrpupaUk; tha;nkhopg; gapw;rpAk;

nkhopahrpupah;: fy;tppj;jFjp> gz;Geyd;fs;> nkhopg;gw;W> ,yf;fz ,yf;fpag; Gyik> Fuypy; Vw;w ,wf;fj;Jld; NgRjy;> csE}y; ty;Yeu;> gilg;ghw;wy; jpwd;> Kd;khjpupahf tpsq;Fjy;> flik czu;Tld; nray;gly;> r%f cwT nfhsy;> gpw MrpupaUld; goFjy;> gapw;rpapd; mbg;gil tpjpfisf; ifahsy;.

tha;nkhopg; gapw;rp: tiuaiw> ,d;wpaikahik> Nehf;fq;fs;;> gad;fs;;> **tha;nkhopg; gapw;rpapid gy;NtW epiyfspy; mspg;gjw;fhd Kiwfs;;:** rpWtu; ghly;fs;> fye;Jiuahly;> fij nrhy;Yjy;> nrhrw;nghopTfs;. cr;rupg;gpy; Vw;gLk; rpf;fy;fs; - kdg;ghlk; nra;jypd; Kf;fpaj;Jtq;fs;-

(Neuk;: 13)

myF 4 ghlj;jpl;lKk; ghlE}Yk;

ghlj;jpl;lk;: tiuaiw> **cau;epiyg; gs;sp ghlj;jpl;lkpLjw;fhd fhuzpfs;:** jdpegu; NtWghL - khwptUk; rKjhak;. ghlE}y;fs;: ghlE}yfspd; mbg;gil> ghlE}ypd; gz;Gfs;. rpwe;jg; ghlE}y;fisj; jahupf;Fk;nghOJ kdjpw;nfhs;sj;jf;f nra;jpfs;. **jw;NghJ eilKiwapy; cs;s**

ghlE}y; gw;wpa ghu;it: E}yfg;gbg;G> tFg;G Ehyfk;> fUtp Ehyfk;.

(Neuk;: 13)

myF 5 - nkhopf;fw;gpj;jypd; EI;gf;$Wfs;

Jizf;fUtpfisg; gad;gLj;Jjy;: trpg;G Ntfj;ij mstply;(lhrp];lh];Nfhg;)> thndhyp> xypg;gjpTehlh> xspg;gjpT> njhiyf;fhl;rp> nkhopg;gapw;wha;Tf;$lk;> fzpg;nghwp> ,izajsk;> nraw;iff;Nfhs;> gy;Y}lfk;> tpz;zuq;fk;> fhnzhyp.

(Neuk;: 13)

ghu;it E}y;fs;

1. Nfhfpyh jq;frhkp (2000) Foe;ij ikaf;fy;tpAk; jkpo;f; fw;gpj;jYk;> mdpr;rk; GUk;];> fhe;jpfpuhk;.

2. NtZNfhghy;> ghrhe;jFkhup (1991) nghJj;jkpo; fw;gpj;jy;> rFe;jyh ntspaPL nrd;id.

3. fzgjp. tp (1997) ew;wkpo; fw;gpf;Fk; Kiwfs;>rhe;jh gg;sp\u;];>nrd;id.

4. ,uj;jpd rghgjp. gp (1997) nrk;nkhopf; fy;tp> rhe;jh gg;sp\u;];> nrd;id.

5. fiyr;nry;tp. nt. (2009) jkpo; gapw;wy; EI;gq;fs; rQ;rPtp gg;sp\H];> <NuhL.

18EDNU08O3: PEDAGOGY OF MATHEMATICS – II

Credit – 4   **Max. Marks: 100**

Hours- 64 Course

objective
To make the students Know the fundamental concepts of Pedagogy of Mathematics.
Specific Outcomes of Learning
The student will be able to
- Know the importance of ICT in teaching and learning of mathematics.
- Understand the principles of curriculum construction with emphasis on content and organization
- Acquaint with the Instructional Resources for Teaching Mathematics.
- Gain the knowledge of good mathematics laboratory
- Acquaint the skills of a good mathematics teacher

UNIT – I: ICT IN MATHEMATICS TEACHING
Teaching Learning Materials (TLM): Meaning, importance and characteristics. Self Learning Materials (SLM): Meaning, importance and characteristics. Edgar Dale's cone of Experience- Projected aids Vs Non-Projected aids. Traditional TLM: Charts, OHP and transparencies, Slide and Film projectors, Charts (to be Deleted), models (Static and working) Flash Cards, Pictures, Black board and Chalk, Flannel, Magnetic and Bulletin boards. Models in teaching mathematics and its educational values. Modern TLM: Uses of Educational Broadcasts: Radio and TV Lessons and educational values in teaching mathematics. Computers, CCTV, Multimedia, Teleconferencing, Video Conferencing, Educate and its uses. Use of Internet in teaching mathematics.   **(Hours: 13)**

UNIT – II: CURRICULUM CONSTRUCTION IN MATHEMATICS
Mathematics Curriculum: Definition, need, importance and types. Principles of Curriculum construction- Criteria for selection and Organization of content. - Critical evaluation of Tamilnadu Secondary School Mathematics curriculum and NCERT school curriculum. - Stages and Different approaches followed in curriculum development in mathematics.

(Hours: 12)

UNIT – III: MATHEMATICS TEXT BOOK
Mathematics text book: Qualities, need, importance. Characteristics and Criteria of a good mathematics text book. - Evaluation of mathematics text book - Mathematics Libraries: Meaning, objectives, organization, important library resources and its utilization. – Steps to make Science (to be modified as Mathematics) library popular among the students. - Content analysis of mathematics text book up to X/XII standard.   **(Hours: 13)**

UNIT – IV: MATHEMATICS LABORATORY
Mathematics laboratory: need, importance, administration (to be Deleted), features and structure. - Planning and organization of mathematics laboratory- Rules, regulations and discipline in the laboratory. Co-curricular Activities: Objectives, organization and activities of mathematics clubs, mathematics exhibitions; fieldtrips and excursions.

(Hours: 13)

UNIT – V: COMPETENCIES OF MATHEMATICS TEACHER

Mathematics teacher: General and specific Qualities and Professional Competencies. Teacher Preparation: Pre service and In-service training of mathematics teacher–types of in-service training. - Improvement of professional competencies of mathematics teacher. Management of mathematics class: Attention to individual differences - Giving importance to problems raised by students. - Evaluation of mathematics teachers: meaning, need. - Modes and tools: Higher authorities, Peer, Self Evaluation, Evaluation by pupils, by informal talk and administering questionnaire - Maintenance of records.   **(Hours: 13)**

PRACTICALS
- ❖ Collection of mathematical Puzzles, riddles etc.
- ❖ Preparation of model practical lab for math's
- ❖ Developing the skills to participate in a mathematical club.
- ❖ Organizing mathematical clubs and the corresponding activities
- ❖ Programmes in MS office
- ❖ Analyzing the curriculum for Mathematics.
- ❖ Participating Group Learning techniques in class discussions.

REFERENCES
1. Aggarwal, J.C (2008). Teaching of mathematics, Vikas Publishing House Pvt.Ltd, UP.

2. Aruljothi, (2013). Teaching of Mathematics – II, Centum Press, New Delhi.

3. James Anice, (2013). Methods of Teaching Mathematics, Neelkamal, New Delhi.

4. Sidhu, K.S (2006). The teaching of mathematics. Sterling Publisher Private Ltd, New Delhi.

5. Servas, W., Varga, T.,(1995). *Teaching School Mathematics,* UNESCO.

18EDNU08O4: PEDAGOGY OF PHYSICAL SCIENCE - II

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the students understand the Pedagogy of Physical Science
Specific Outcomes of Learning
The student will be able to

- Know the importance of ICT in teaching Physical Science.
- Understand well about curriculum construction.
- Verify the qualities of a good science text book.
- Gain the knowledge of constructing a good physical science laboratory.
- Understand the qualities and competencies of a good science teacher.

UNIT – I: LEARNING RESOURCES IN PHYSICAL SCIENCE
Teaching Learning Materials (TLM): Meaning, Importance and Characteristics. Self Learning Materials (SLM): Meaning, importance and characteristics. Edgar Dale's cone of Experience- Projected Vs Non-Projected aids. Traditional TLM: Charts, OHP, Slide and Film projectors, Charts, Models (Static and working) Flash Cards, Pictures, Chalk – Black, Flannel, Magnetic and Bulletin boards. Modern TLM: Uses of Educational Broadcasts: Radio and TV, Computers, CCTV, Multimedia, Teleconferencing, Video Conferencing, Edusat and Internet.   **(Hours: 13)**

UNIT – II: CURRICULUM CONSTRUCTION IN PHYSICAL SCIENCE
Physical Science Curriculum: Definition, need, importance and types. Principles of Curriculum construction- Criteria for selection and Organization of content. - Critical evaluation of Tamil Nadu Secondary School Physical Science curriculum and NCERT school curriculum. Curriculum improvement projects in India and Abroad: Indian Education Commission, New Policy on Education (NPE), Nuffield Physics and Chemistry Project, CHEM - Study, PSSC   **(Hours: 13)**

UNIT – III: SCIENCE TEXT BOOK
Physical science text book: Qualities, need, importance. Characteristics and Criteria of a good science text book. - Evaluation of Science text book (Hunter's Score Card) - Science Libraries: Meaning, objectives, organization, important library resources and its utilization – Steps to make science library popular among the students - Content analysis of Physical science text book up to X/XII standard.   **(Hours: 12)**

UNIT – IV: PHYSICAL SCIENCE LABORATORY
Physical Science laboratory: need, importance, administration, features and structure. - Planning and organization of science laboratory-Storage of apparatus and chemicals. - Improvisation of apparatus - Records and Registers to be maintained – Rules, regulations and discipline in the laboratory -Accidents and first aid. Co-curricular Activities: Objectives, organization and activities of science clubs, science fairs and exhibitions; fieldtrips and excursions.   **(Hours: 13)**

UNIT – V: COMPETENCIES OF SCIENCE TEACHER

Science teacher: Qualification, Qualities and Professional Competencies. Professional development of science teacher - Role of reflective Journal. Pre service and In-service training – types of in-service training - Management of science class: Attention to individual differences - Teacher as a researcher - Evaluation of science teachers: meaning,need - Modes and tools: Higher authorities, Peer, Self Evaluation, Evaluation by pupils,by informal talk and admin - Maintenance of records.   **(Hours: 13)**

REFERENCES

1. Aggarwal J.C, (2007), Essentials of Educational Technology. Innovations in Teaching-Learning. Vikas Publications House, New Delhi.

2. Edger Dale, Audio-Visual Methods in Teaching, Revised Edition, Dryden Press, New York.

3. Guptha, *S.K. (*2001), Teaching of Physical Science in Secondary Schools, Sterling Publications.

4. Sharma.R.C. *(*2008), Modern Science Teaching. Dhanpat Rai Publishing Company (P) Ltd., New Delhi.

5. Sivarajan K. (2006), Trends and developments in Modern Educational Practices, Calicut University.

17CSKU 0201: SOFT SKILLS (FOR SCIENCE SUBJECTS)
17CSKU0301: SOFT SKILLS (FOR SOCIAL SCIENCES)
(COMPULSORY SOFT SKILLS COURSE – 2 CREDITS – 2 HOURS/WK)

OBJECTIVES

To enhance holistic development of students and improve their employability skills.

OBJECTIVES OF LEARNING

- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication and problem solving skills.
- To re-engineer attitude and understand its influence on behavior.

UNIT I PERSONALITY TRAITS

- General and Individual Traits: An Introduction
- Growth Traits: An Introduction

UNIT 2 GENERAL AND INDIVIDUAL TRAITS

- Honesty
- Reliability

UNIT 3 GENERAL AND INDIVIDUAL TRAITS

- Good attitude
- Common Sense

UNIT 4 GROWTH TRAITS

- Self-directed skills
- Self-monitoring and accepting correction

UNIT 5 GROWTH TRAITS

- Critical thinking skills
- Commitment to continuous training and learning

Textbook:

Board of Editors. *Soft Skills for Positive Traits.* Chennai: OBS, 2014.

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MODULAR COURSE

18EDNU07M1: TEACHING LEARNING MATERIALS (TLM) PREPARATION

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Credit – 2   **Max. Marks: 50**

1. **CHARTS PREPARATION WORK**

   - Picture Chart
   - Diagram Chart
   - Activity Chart
   - Flip Chart
   - Strip Chart
   - Mini Chart
   - Continuity Chart

2. **MODELS**

   - 2 D Model
   - 3 D Model
   - Partially Working Model
   - Working Model
   - Sand-tray Model
   - Bridge Model
   - Non-Working Model

3. **SCROLL CARD**

   - Round
   - Rectangle
   - Hexagonal

4. **ALBUMS**

   - Optional - I Optional – II Optional – III Optional – IV
   - Physical Education

5. REAL OBJECTS

6. BOOKLETS

7. VISUALS

8. INNOVATIVE TLM

9. SELF LEARNING MATERIALS

10. LOW COST AND NO COST TLM

11. TRANSPARENCIES

12. CDs AND ICT ORIENTED TLM

18EDN07M2: ENVIRONMENTAL EDUCATION

Credit – 2   **Max. Marks: 50**

Course Objective

To make the students familiarize with environmental Education

Specific Outcomes of Learning

The student will be able to

- Acquireknowledge and understand about the environmental education.
- Understand the concept, scope and objective of environmental education.
- Acquaint the students with environmental pollution.
- Understand the Instructional Strategies of Environmental Education.
- Acquire knowledge about issues and polices of Environmental Education.

UNIT I–FUNDAMENTAL CONCEPT OF ENVIRONMENTAL EDUCATION

Environmental Education:-Meaning, Principles, Nature and Scope, Aims and objective. Environmental awareness:-Need andimportance, strategies. Environmental and Disaster management:-Meaning, concept, scope, Need and Importance.   **(Hours: 6)**

UNIT II–ENVIRONMENTAL POLLUTION

Pollution:-Meaning, Definition, Environmental hazards, Types of Pollution: Soil, Air, Noise, Water. GlobalWarming, Ozone depletion, Acid rain–Role of Population explosion, urbanization Deforestation in Environmental pollution.–Biodiversity-Climate change- ewastage.   **(Hours: 6)**

UNIT III--ENVIRONMENTAL PROTECTION

Environmental Protection:Meaning, Role, Responsibilities and competencies of teachers– Role of Government and Non-government agencies in Environmental Protection –Roleof media in Environmental awareness– Environmental Education in school at different levels- Strategies and approaches of environmental education- Concept of green schools- Environmental sustainable development-Education for environmental sustainability- Ecoclubs.   **(Hours: 7)**

UNIT IV– ISSUES AND POLICES IN ENVIRONMENTAL EDUCATION

Issues:-Stockholm conferences Rio declaration – Nairobi conferences - Environmental Movements:– silentValleyproject – Chipko Movement–NarmadaValleyProject–National TestRange   at Baliupal – Need and objectives of conservation– Policies:-Legislations for Environmental Protection in India- Constitutional   Amendments - Environmental laws Environmental rights.   **(Hours: 7)**

UNIT   V–NATIONAL   AND   INTERNATIONAL   ORGANIZATIONS   FOR ENVIRONMENTAL EDUCATION.

National Organizations for Environmental Education:-Ministry of Environment and Forestry(MOEF), Centre for   Environmental Education (CEE). Environmental Information System(EIS). Botanical Survey of India(BSI). Zoological survey of India(ZSI). National instituteDisastermanagement(NIDM). InternationalorganizationsforEnvironmentaleducation:- UNESCO-UNO-WHO-Environmentalawards – Nobleprizes.   **(Hours: 6) REFERENCES**

1. BharuchaErach,Textbookof EnvironmentalStudies,NewDelhi:Universitiespress,2005.

2. Kumar,S.B,EnvironmentalProblemsandGandhianSolutions,New   Delhi:Deep&Deep Publications.2002.

3. PankajShrivastava,singhD.P,EnvironmentalEducation,NewDelhi:AnmolPublication Pvt.Ltd,2002.

4. Sharma.P.D,EnvironmentalBiology,Meerut:RastogiPublications,2000.

5. SudhirM.A.and MasilaMani–EnvironmentalIssues, NewDelhi:ReliancePublications,2003.