B.Sc. Physics I Semester syllabus.pdf

Physics_IIsem_2016-17AB.pdf

B.Sc. Physics IIISemester syllabus.pdf

Physics_IVsem_2015-16AB.pdf

Physics_Vsem_2015-16AB.pdf

Physics_VI Sem_2015-16AB_23112017.pdf

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

CBCS / Semester System

(W.e.f. 2016-17 Admitted Batch)

I Semester Syllabus

PHYSICS

(For Mathematics Combinations)

PAPER I: MECHANICS& PROPERTIES OF MATTER

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I **(10 hrs)**

1. Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II **(10 hrs)**

2. Mechanics of particles

Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scattering cross-section, Rutherford scattering-derivation.

UNIT-III **(16 hrs)**

3. Mechanics of Rigid bodies

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum, Euler equations and its applications, precession of a top, Gyroscope, precession of the equinoxes.

4. Mechanics of continuous media

Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT-IV **(12hrs)**

5. Central forces

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equatglobal ion of motion under a central force.Derivation of Kepler’s laws.Motion of satellites, idea of Global Positioning System (GPS).

UNIT-V **(12 hrs)**

6. Special theory of relativity

Galilean relativity, absolute frames. Michelson-Morley experiment, negative result.Postulates of special theory of relativity.Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation.

REFERENCE BOOKS:

1. B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. Unified Physics, Vol. 1, S.L. Gupata & S. Guptha, Jai Prakash Nath & Co, Meerut.
4. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
5. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications, Delhi
6. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.

Practical paper 1: Mechanics & Properties of Matter

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Viscosity of liquid by the flow method (Poiseuille's method)
2. Young's modulus of the material of a bar (scale) by uniform bending
3. Young's modulus of the material a bar (scale) by non- uniform bending
4. Surface tension of a liquid by capillary rise method
5. Determination of radius of capillary tube by Hg thread method
6. Viscosity of liquid by Searle'sviscometer method
7. Bifilar suspension –moment of inertia of a regular rectangular body.
8. Determination of moment of inertia using Fly-wheel
9. Determination of the height of a building using a sextant.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

.

Examples

Seminars	- A topic from any of the Units is given to the student and asked to give a brief seminar presentation.
Group discussion	- A topic from one of the units is given to a group of students and asked to discuss and debate on it.
Assignment	- Few problems may be given to the students from the different units and asked them to solve.
Field trip	- Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.
Study project	- Web based study of different satellites and applications.

Domain skills:
Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

NOTE: Problems should be solved at the end of every chapter of all Units.

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam (internal). Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to VIis 4 hours per paper for theory and 2 hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be distributed as30 marks for experiment
   10 marks for viva
   10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

*****NOTE: Practical syllabus is same for both Mathematics and Non Mathematics combinations**

ADIKAVI NANNAYA UNIVERSITY

CBCS/ SEMESTER SYSTEM
SEMESTER II : B.Sc Physics
(for 2016-17 Admitted Batch)

Paper II:Waves & Oscillations
(For Maths Combinations)

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I (12 hrs)

1. Simple Harmonic oscillations

Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum-measurement of 'g', Principle of superposition, beats, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.

UNIT-II (12 hrs)

2. Damped and forced oscillations

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance and velocity resonance.

UNIT-III (10 hrs)

3. Complex vibrations

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave, simple problems on evolution of Fourier coefficients.

UNIT-IV (17hrs)

4. Vibrating strings: 8 hrs

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones and harmonics. Energy transport and transverse impedance.

5. Vibrations of bars: 9 hrs

Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end. Tuning fork.

UNIT-V (9 hrs)

6. Ultrasonics: 9hrs

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves.Applications of ultrasonic waves.

REFERENCE BOOKS:

1. BSc Physics Vol.1, Telugu Academy, Hyderabad.
2. Waves and Oscillations. N. Subramanyam and Brijlal, Vikas Pulications.

3. Unified Physics Vol., Mechanics, Waves and Oscillations, Jai Prakash Nath&Co.Ltd.
4. Fundamentals of Physics. Halliday/Resnick/Walker ,Wiley India Edition 2007.
5. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy,Orient Longman.
6. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
7. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004
8. Introduction to Physics for Scientists and Engineers. F.J. Buche. McGraw Hill.

Practical Paper II: Waves & Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Volume resonator experiment
2. Determination of 'g' by compound/bar pendulum
3. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
4. Determination of the force constant of a spring by static and dynamic method.
5. Determination of the elastic constants of the material of a flat spiral spring.
6. Coupled oscillators
7. Verification of laws of vibrations of stretched string –sonometer
8. Determination of frequency of a bar –Melde's experiment.
9. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
10. Formation of Lissajous figures using CRO.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

.

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project - Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

CBCS / Semester System

(W.e.f. 2015-16 Admitted Batch)

III Semester Syllabus

PHYSICS

(For Mathematics Combinations)

WAVE OPTICS

Work load:60 hrs per semester **4 hrs/week**

UNIT-I **(8 hrs)**

1. Aberrations:

Introduction – monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration-the achromatic doublet. Achromatism for two lenses (i)in contact and (ii) separated by a distance.

UNIT-II **(14hrs)**

2. Interference

Principle of superposition – coherence-temporal coherence and spatial coherence-conditions for interference of light. Fresnel's biprism-determination of wavelength of light – change of phase on reflection. Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (cosine law) – colors of thin films-

Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film). Determination of diameter of wire, Newton's rings in reflected light. Michelson interferometer, Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer.

UNIT-III **(14hrs)**

3. Diffraction

Introduction,distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction –Diffraction due to single slit- Fraunhoffer diffraction due to double slit- Fraunhoffer diffraction pattern with N slits (diffraction grating).Resolving power of grating, Determination of wavelength of light in normal incidence and minimum deviation methods using diffraction grating,

Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-difference between interference and diffraction.

UNIT-IV **(10 hrs)**

4. Polarisation:

Polarized light: methods of polarization polarization by reflection, refraction, double refraction, scattering of light-Brewster's law-Mauls law-Nicol prism polarizer and analyzer-

Quarter wave plate, Half wave plate-optical activity, determination of specific rotation by Laurent's half shade polarimeter- Babinet's compensator - idea of elliptical and circular polarization

UNIT-V **(14hrs)**

5. Lasers and Holography

Lasers: introduction, spontaneous emission, stimulated emission. Population Inversion, Laser principle-Einstein coefficients-Types of lasers-He-Ne laser, Ruby laser- Applications of lasers. Holography: Basic principle of holography - Gabor hologram and its limitations, Applications of holography.

6. Fiber Optics

Introduction - different types of fibers, rays and modes in an optical fiber, fiber material, principles of fiber communication (qualitative treatment only), advantages of fiber optic communication.

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
3. Unified Physics Vol.II Optics & Thermodynamics – Jai Prakash Nath&Co.Ltd., Meerut
4. Optics,F..A. Jenkins and H.G. White, Mc Graw-Hill
5. Optics, AjoyGhatak,Tata Mc Graw-Hill.
6. Introduction of Lasers – Avadhanulu, S.Chand& Co.
7. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Paper III: Wave Optics

Work load:30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Determination of radius of curvature of a given convex lens-Newton's rings.
2. Resolving power of grating.
3. Study of optical rotation – polarimeter.
4. Dispersive power of a prism.
5. Determination of wavelength of light using diffraction grating-minimum deviation method.
6. Determination of wavelength of light using diffraction grating-normal incidence method.
7. Resolving power of a telescope.
8. Refractive index of a liquid-hallow prism
9. Determination of thickness of a thin wire by wedge method
10. Determination of refractive index of liquid-Boy's method.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project - Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

NOTE: Problems should be solved at the end of every chapter of all Units.

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam (internal). Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to VI is 4 hours per paper for theory and 2 hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be distributed as30 marks for experiment
   10 marks for viva
   10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

*****NOTE: Practical syllabus is same for both Mathematics and Non Mathematics combinations**

ADIKAVI NANNAYA UNIVERSITY
CBCS/SEMESTER SYSTEM
IV SEMESTER: B.Sc PHYSICS
W.E.FROM 2015-16 ADMITTED BATCH

Paper IV: Thermodynamics &Radiation Physics
(For Maths Combinations)

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I (10 hrs)

1. Kinetic theory of gases

Introduction –Deduction of Maxwell's law of distribution of molecular speeds, experimental verification. Transport phenomena – Mean free path - Viscosity of gases-thermal conductivity-diffusion of gases.

UNIT-II(12 hrs)

2. Thermodynamics

Introduction- Isothermal and adiabatic process- Reversible and irreversible processes-Carnnot's engine and its efficiency-Carnot's theorem-Second law of thermodynamics. Kelvin's and Claussius statements-Entropy, physical significance –Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of Universe– Temperature-Entropy (T-S) diagram and its uses - Change of entropy of a perfect gas-change of entropy when ice changes into steam.

UNIT-III(12 hrs)

3. Thermodynamic potentials and Maxwell's equations

Thermodynamic potentials-Derivation of Maxwell's thermodynamic relations-Clausius-Clayperon's equation-Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and vander Waal's gas.

UNIT-IV(12 hrs)

4. Low temperature Physics

Introduction-Joule Kelvin effect-Porous plug experiment - Joule expansion-Distinction between adiabatic and Joule Thomson expansion-Expression for Joule Thomson cooling-Liquefaction of helium, Kapitza's method-Adiabatic demagnetization, Production of low temperatures -applications of substances at lowtemperature-effects of chloro and fluoro carbons on ozone layer.

UNIT-V(14 hrs)

5. Quantum theory of radiation

Blackbody-Ferry's black body-distribution of energy in the spectrum of black body-Wein's displacement law,Wein's law, Rayleigh-Jean's law-Quantum theory of radiation-Planck's law-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination – Angstrompyrheliometer-determination of solar constant, Temperature of Sun.

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. Thermodynamics, R.C.Srivastava, S.K.Saha& Abhay K.Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath&Co.Ltd., Meerut
4. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
5. Heat, Thermodynamics and Statistical Physics-N Brij Lal, P Subrahmanyam, PS Hemne, S.Chand& Co.,2012
6. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
7. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Practical Paper IV: Thermodynamics & Radiation Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
2. Thermal conductivity of bad conductor-Lee's method
3. Thermal conductivity of rubber.
4. Measurement of Stefan's constant.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple - potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - thermistor.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project - Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc.: Physics Semester V- Paper V

Electricity, Magnetism and Electronics

Credits: 03

3Hour/Week

Total Hours : 45

UNIT-I (9 hrs)

1. **Electric field intensity and potential:**
   Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii) charged spherical shell .
2. **Dielectrics:**
   Electric dipole moment and molecular polarizability- Electric displacement D, electric polarization P –relation between D, E and P- Dielectric constant and susceptibility. Boundary conditions at the dielectric surface.

UNIT-II (9 hrs)

3. **Electric and magnetic fields**
   Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid – Hall effect – determination of Hall coefficient and applications.
4. **Electromagnetic induction**
   Faraday's law-Lenz's law- Self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field. Transformer - energy losses - efficiency.

UNIT-III (9 hrs)

5. **Alternating currents and electromagnetic waves**
   Alternating current - Relation between current and voltage in LR and CR circuits, vector diagrams, LCR series and parallel resonant circuit, Q –factor, power in ac circuits.
6. **Maxwell's equations**
   Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation). Pointing theorem (statement), production of electromagnetic waves (Hertz experiment).

UNIT-IV (9 hrs)

7. **Basic electronics:**
   PN junction diode, Zener diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation betweenα, β and γ - transistor (CE) characteristics , Transistor as an amplifier.

UNIT-V: (9 hrs)

8. **Digital electronics**

Number systems - Conversion of binary to decimal system and vice versa. Binary subtraction (2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder.

Textbooks

1. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath – *S. Chand & Co.* for semi conductor & Digital Principles)
2. Fundamentals of Physics- Halliday/Resnick/Walker - *Wiley India Edition 2007.*
3. Berkeley Physics Course – Vol. II - Electricity and Magnetism – Edward M Purcell –*The McGraw-Hill Companies*.
4. Electricity and Magnetism – D.N. Vasudeva. *S. Chand & Co.*
5. Electronic devices and circuits – Millman and Halkias. *Mc.Graw-Hill Education.*
6. Electricity and Magnetism Brijlal and Subramanyam. *Ratan Prakashan Mandir.*
7. Digital Principles and Applications by A.P. Malvino and D.P. Leach. *McGraw Hill Education.*
8. Unified Physics Vol.3 – S.L. Gupta and Sanjeev Gupta – Jai Prakasah Nath & Co-Meerut.

Practical Paper V:Electricity, Magnetism & Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvonometer.
2. LCR circuit series/parallel resonance, Q factor.
3. Determination of ac-frequency –sonometer.
4. Verification of Kirchoff's laws and maximum power transfer theorem.
5. Field along the axis of a circular coil carrying current.
6. PN Junction Diode Characteristics
7. Zener Diode Characteristics
8. Transistor CE Characteristics- Determination of hybrid parameters
9. Carey Foster's Bridge – measurement of specific resistance.
10. Impedance and Power factor of LR Circuit.

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc.: Physics Semester V- Paper V

Electricity, Magnetism and Electronics

(Model Paper)

TIME: 3Hrs **Max. Marks: 75**

SECTION-A

Answer any FIVE questions **5x5=25M**

1. Derive the relation among D, E and P.
   D, E మరియు P ల మధ్య సంబంధమును ఉత్పాదించుము.
2. Derive expression for the potential due to a point charge.
   ఏదైనా ఒక బిందువు వద్ద విద్యుత్ పోటన్షియల్‌కు సమీకరణాన్ని ఉత్పాదించుము.
3. What is Hall Effect? Write the applications of Hall Effect.
   హాల్ ప్రభావం అనగానేమి? హాల్ ప్రభావానికి అనువర్తనాలు వ్రాయుము.
4. Derive an expression for the self inductance of a long solenoid.
   పొడవైన సోలనాయిడ్ యొక్క స్వయం ప్రేరకత్వమునకు సమీకరణంను ఉత్పాదించుము.
5. Write the integral and differential forms of Maxwell's equations.
   మాక్స్‌వెల్ సమీకరణాల యొక్క సమాకలన మరియు అవకలన రూపాలను వ్రాయుము.
6. Calculate the resonance frequency of a LCR series circuit with a resistance 10Ω, inductance 20mH and a capacitance of 0.02μF.
   10Ω ల నిరోధం, ల ఇండక్టెన్స్ 20mH , capacitance 0.02μF గల
   LCR శ్రేణి వలయానికి అనునాద పౌనఃపున్యము కనుగొనుము.
7. For a transistor α =0.95 and its emitter current is 1mA. Find its base and collector currents.
   ట్రాన్సిష్టర్ α విలువ 0.95 మరియు ఎమిటర్ ప్రవాహం1mA. ఆ ట్రాన్సిస్టర్ భేస్ మరియు కలక్టర్ ప్రవాహాలను కనుగొనుము.
8. Convert following Binary to Decimal.
   క్రింది సంఖ్యలను ద్విసంఖ్య మానం నుండి దశాంశమానం లోకి మార్చుము.
   (i) $(10100)_2$ (ii) $(11001)_2$

SECTION-B

Answer any FIVE questions **5x5=25M**

9. (a) State and prove Gauss's law.
   గౌస్ సూత్రాన్ని వ్రాసి నిరూపించుము.

   (or)

   (b) Explain the boundary conditions at the dielectric surface.
   రోధక ఉపరితలం వద్ద సరిహద్దు నియామాల గురించి వివరించుము.

10. (a) State and explain Biot - Savart's law. Derive an expression for the magic induction at a point on the axis of a current carrying solenoid.
    బయోట్-సావర్ట్ నియమమునకు తెలిపి, వివరింపుము. విద్యుత్ ప్రవహిస్తున్న సొలనాయిడ్ అక్షము మీద అయస్కాంత ప్రేరణకు సమీకరణము ను రాబట్టుము.

    (or)

(b) Describe the construction and working of a transformer. Explain its energy losses.
పరివర్తకం యొక్క నిర్మాణమును, పనిచేయు విధానమును వర్ణించుము. దాని శక్తి నష్టాలను విశదపరుచుము.

11. (a) Describe the behavior of series LCR circuit when an alternating voltage is applied to it. Explain the condition for resonance.
ఒకLCR శ్రేణి వలయమునకు ఏకాంతర వోల్టేజిని అనువర్తింప చేసినప్పుడు దాని ప్రవర్తనను వివరించుము. దాని అను నాద షరతును వివరించుము.

(or)

(b) Derive the equation of electromagnetic wave and hence determine the velocity of propagation of electromagnetic wave in free space.
విద్యుదయస్కాంత తరంగ సమీకరణాన్ని ఉత్పాదించి, తద్వారా శూన్యంలో తరంగ వేగమునకు సమీకరణాన్ని ఉత్పాదించుము.

12. (a) What is transistor? Explain the working of PNP and NPN Transistor.
ట్రాన్సిష్టర్ అనగానేమి? PNP మరియు NPN ట్రాన్సిష్టర్‌లు పనిచేయు విధానమును వివరించుము.

(or)

(b) Explain the CE characteristics of a Transistor.
ట్రాన్సిష్టర్ CE అభిలక్షణాలను గురించి వివరింపుము.

13. (a) Explain the functioning of a Half Adder and a Full Adder along with respective truth tables.
అర్ద సంకలని మరియు పూర్ణ సంకలని లు పనిచేయు విధానమును వాటికి సంబందించిన సత్య పట్టికలతో సహ పట్టికల తో సహ వివరింపు ము.

(or)

(b) State and prove Demorgan's laws. Realize AND, OR and NOT gates from NAND logic.
డీమోర్గాన్ సిద్ధాంతములను పేర్కొని, నిరూపించుము. NAND లాజిక్ నుంచి AND, OR మరియు NOT ద్వారములను రాబట్టుము.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-V

Electricity, Magnetism and Electronics

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. **Unit - I**	2	2	30
2. Unit - II	2	2	30
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1Problem	25
5.Unit - V	2	1	25
Total			140

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. : Physics Paper VI Semester-V

Modern Physics

No. of Credits: 03
3 Hour/Week
Total Hours : 45

UNIT-I (9 hrs)

1. Atomic and molecular physics

Introduction –Drawbacks of Bohr's atomic model. Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it. L-S and j- j coupling schemes. Zeeman effect(Definition only) -Raman effect, hypothesis, Stokes and Anti Stokes lines. Quantum theory of Raman effect. Experimental arrangement – Applications of Raman effect.

UNIT-II (9 hrs)

2. Matter waves & Uncertainty Principle

Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves - Davisson and Germer experiment – Heisenberg's uncertainty principle for position and momentum (x and p) & Energy and time (E and t).

UNIT-III (9 hrs)

3. Quantum (wave) mechanics

Basic postulates of quantum mechanics-Schrodinger time independent and time dependent wave equations-derivations. Physical interpretation of wave function. Eigen functions, Eigen values. Application of Schrodinger wave equation to particle in one dimensional infinite box.

UNIT-IV(9 hrs)

4. General Properties of Nuclei

Basic ideas of nucleus -size, mass, charge density (matter energy), binding energy, magnetic moment, electric moments. Liquid drop model and Shell model (qualitative aspects only) - Magic numbers.

5. Radioactivity decay

Alpha decay: basics of α-decay processes. Theory of α-decay, Gamow's theory, Geiger Nuttal law.β-decay, Energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis.

UNIT-V (9 hrs)

6. Crystal Structure

Amorphous and crystalline materials, unit cell, Miller indices, reciprocal lattice, types of lattices, diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method.

7. Superconductivity

Introduction - experimental facts, critical temperature - critical field - Meissner effect – Isotope effect - Type I and type II superconductors - applications of superconductors.

Textbooks

1. Modern Physics by G. Aruldhas & P. Rajagopal. *Eastern Economy Edition*.
2. Concepts of Modern Physics by Arthur Beiser. *Tata McGraw-Hill Edition*.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. *S. Chand & Co.*
4. Nuclear Physics by D.C. Tayal, *Himalaya Publishing House.*
5. Molecular Structure and Spectroscopy by G. Aruldhas. *Prentice Hall of India, New Delhi.*
6. Spectroscopy –Atomic and Molecular by Gurdeep R Chatwal and Shyam Anand – *Himalaya Publishing House.*
7. Third Year Physics - *Telugu Academy*.
   Elements of Solid State Physics by J.P. Srivastava. (for chapter on nanomaterials)- *Prentice-hall of India Pvt. Ltd*

Practical Paper VI:Modern Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Study of absorption of α-rays.
5. Study of absorption of β-rays.
6. Determination of M & H.
7. Energy gap of a semiconductor using junction diode.
8. Energy gap of a semiconductor using thermister.
9. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
10. Verification of De Morgan's Theorems.
11. Verification of Truth Tables of Universal gates
12. Verification of truth tables of Half and Full adders.

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. : Physics Paper VI Semester-V

Modern Physics

Model Paper

TIME: 3Hrs **Max. Marks: 75**

SECTION-A

Answer any FIVE questions **5x5=25M**

1. Explain L-S coupling and J-J coupling.
   L-S సమ్మేళనము మరియు J-J సమ్మేళనములను గూర్చి వివరించండి.
2. Explain Raman Effect and symmetry of Raman lines on the basis of quantum theory.
   క్వాంటం సిద్ధాంతము ఆధారంగా రామన్ ఫలితాన్ని రామన్ రేఖల సౌష్టవమును వివరించండి.
3. Explain liquid drop model.
   ద్రవ బిందు నమూనాను వివరించుము.
4. Explain miller-indices.
   మిల్లర్ సూచికలు గూర్చి వివరముగా తెల్పండి.
5. Explain Basic Postulates of Quantum Mechanics.
   క్వాంటమ్ సిద్ధాంతము యొక్క ప్రతిపాదనను వివరించండి
6. Calculate the de-Broglie wave length associated with a proton moving with a velocity of 2200m\sec.($h=6.625x10^{-34}$J-S,$m=1.6 \times 10^{-27}$kg)
   2200m\sec వేగంతో చలిస్తున్న ప్రోటాన్ యొక్క డీబ్రోగ్లీ తరంగ ధైర్ఘ్యంను లెక్కించుము.
   ($h=6.625x10^{-34}$J-S, $m=1.6 \times 10^{-27}$kg)
7. A neutron breaks into a proton and an electron. Calculate the mass defect in the reaction. ($m_P=1.6725x10^{-27}$Kg ,$m_e=9x10^{-31}$kg,$m_n=1.6747x10^{-27}$Kg)
   ఒక కేంద్రక చర్యలో ఒక న్యూట్రాన్ ప్రోటాన్ మరియు ఎలక్ట్రాన్ గా విడిపోయింది. ద్రవ్యరాశి లోపం లెక్కించుము.
   ($m_P=1.6725X\ 10^{-27}$Kg , $m_e=9x10^{-31}$kg,$m_n=1.6747x10^{-27}$Kg)
8. X-rays of wave length $1.54A^0$ are diffracted by a crystal. The incident angle 11^0, what is the lattice space distance.
   స్ఫటికం వలన తరంగ ధైర్ఘ్యం $1.54A^0$ కలిగిన X-
   కిరణాలు వివర్తనం చెందినది. పతనకోణం11^0 జాలక అంతర దూరమును కనుగొనుము.

SECTION-B

Answer any ALL questions **5x10=50M**

9. (a) Describe stern and Gerlach experiment. What is its importance?
   స్టెర్న్–గెర్లాక్ ప్రయోగాన్ని వివరించండి. ఆ ప్రయోగ ప్రాముఖ్యత ఏమిటి?

   (or)

   (b)What is Raman Effect? How it is experimentally studied.
   రామన్ ఫలితం అనగానేమి? దానిని ప్రయోగ పూర్వకంగా వివరించండి.

10. (a) Explain De-Broglie hypothesis for matter waves. Derive an expression for De-broglie wave length.

    ద్రవ్య తరంగముల గురించి డీ బ్రోగ్లీ పరికల్పన వివరించండి. డీ-బ్రోగ్లీ తరంగ ధైర్ఘ్యమునకు సమీకరణం ఉత్పాదించుము.

    (or)

    (b) Explain Devison and Germer experiment for detection of matter waves.

    ద్రవ్య తరంగాలను శోదించుటకు డెవిజన్ గెర్మర్ ప్రయోగాన్ని వివరింపుము.

11. (a) Derive Schrödinger's time independent wave equation.

    కాలం మీద ఆధార పడని ష్రొడింగర్ తరంగ సమీకరణమునకు ఉత్పాదించుము.

    (or)

    (b) Obtain an expression for the energy of a particle in one dimensional potential wall.

    ఏక నిరూపక పోటెన్షియల్ కూపములోని కణము యొక్క శక్తికి సమీకరణము రాబట్టండి.

12. (a) Explain magic numbers using nuclear shell model.

    కేంద్రక కర్పర నమూనాను ఉపయోగించి మ్యాజిక్ సంఖ్యలను వివరించండి?

    (or)

    (b) Explain Gamow theory of α –decay.

    α-కణ క్షీణత విషయంలో గేమో సిద్ధాంతమును వివరించుము.

13. (a) Describe laue method for the study of crystal structure.

    స్ఫటిక నిర్మాణంకు సంబంధించి లవే ప్రయోగాన్ని వర్ణించండి?

    (or)

    (b) What is super conductivity? Explain Meissner effect. Mention the properties of super conductivity.

    అతి వాహకత్వం అనగానేమి? మిస్నర్ ఫలితాన్ని వివరింపుము.అతి వాహకాల ధర్మాలను తెల్పుము.

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. : Physics Paper VI Semester-V

Modern Physics

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. **Unit - I**	2	2	30
2. Unit - II	2	1Problem	25
3.Unit - III	2	1	25
4.Unit -IV	2	1+1Problem	30
5.Unit - V	2	1+1Problem	30
Total			140

AdiKavi Nanayya University::Rajamahendravam

Structure of Physics under CBCS

w.e.f. 2015-16 ADMITTED BATCH

Year	*Semester*	*Paper*	*Title*	*Hours*	*Marks*	*Credits*
III	*Any one paper from (A), (B) and (C) can be selected **VI** **Any one cluster (Set of Three Papers) from VIII-A or VIII-B or VIII-C can be selected	**VII (A)***	Analog and Digital Electroncis	**3**	**100**	**03**
			Lab	**2**	**50**	**02**
		VII (B)*	Material Science			
			Lab			
		VII (C)*	Renewable Energy			
			Lab			
		**** VIII-A**	**Cluster Elective-A**			
			VIII-A-1 : Introduction to Microprocessors and Microcontrollers.	**3**	**100**	**03**
			VIII-A-2 : Computational Methods and Programming**.**	**3**	**100**	**03**
			VIII-A-3: Electronic Instrumentation	**3**	**100**	**03**
			VIII-A-1 : Practical	**2**	**50**	**02**
			VIII-A-2 : Practical	**2**	**50**	**02**
			VIII-A 3:Practical/ Project	**2**	**50**	**02**
			Or			
		**** VIII-B**	**Cluster Elective-B**			
			VIII-B-1 : Fundamentals of Nanoscience	**3**	**100**	**03**
			VIII-B-2 : Synthesis and Characterization of Nanomaterial	**3**	**100**	**03**
			VIII-B-3: Applications of Nanomaterials and devices	**3**	**100**	**03**
			VIII-B1 : Practical			
			VIII-B-2 : Practical	**2**	**50**	**02**
			VIII-B-3: Practical/ Project	**2**	**50**	**02**
				2	**50**	**02**

		** VIII-C	**Cluster Elective-B** **VIII-C-1 :** Solar Thermal and Photovoltaic Aspects **VIII-C-2 : Wind, Hydro and Ocean Energies** **VIII-C-3:** Energy Storage Devices. **VIII-C-1 : Practical** **VIII-C-2 : Practical** **VIII-C-3: Practical/ Project**	**3** **3** **3** **2** **2** **2**	**100** **100** **100** **50** **50** **50**	**03** **03** **03** **02** **02** **02**

Project guide lines

1. Before allot individual project to student conduct seminar to brief about objective & what the is gaining learn
2. Conduct every month seminar on project to identify progress
3. Project include Introduction abstract implementation finally results & discussion
4. References for project if necessary
5. Project help to order theoretical frame work Explain in the following title may chose for project class room.

Model question paper for all theory papers

Time:3hrs **Max.Marks:75**

Section-A

Answer any FIVE of the following **5x5=25M**

(At least one question should be set from each unit)

1.
2.
3.
4.
5.
6.
7.
8.

Section-B

Answer ALL the Questions with internal choice from all units. **5x10=50M**

(Two questions are to be set from each unit with either or type)

NOTE:

1. Each theory paper is of 100 marks (75 marks external and 25 marks internal) and practical paper is of 50 marks(external).
2. The teaching work load per week for semesters I to IV is 4 hrs and for semesters V and VI are 3 hrs. Work load for all practical/Project papers are 2 hrs per week.
3. The duration of the examination (both theory and practical papers) is 3 hrs.

Scheme of Valuations for all Practical Papes

Practicals	**50 marks**
Formuala & Explanation	6
Tabular form + graph + Circuit diagram	6
Observations	12
Calculations,graph, precautions&results	6
Viva Voce	10
Record	10

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Elective Paper –VII-(A):Analog and Digital Electronics

3 Hour/Week
Total Hours: 45

w.e.f : 2017-2018

Unit-I (10 Hours)

1. FET-Construction, Working, characteristics and uses; MOSFET-enhancement MOSFET, construction and working , drain characteristics of MOSFET, applications of MOSFET
2. Photo electric devices: Structure and operation, characteristics, application of LDR, LED

Unit-II (9Hours)

3. Operational Amplifiers: Characteristics of ideal and practical Op-Amp (IC 741), Basic differential amplifiers, Op-Amp supply voltage, IC identification, Internal blocks of Op-Amp, CMRR, slew rate, concept of virtual ground.

Unit-III (8 Hours)

4. Applications of Op-Amp: Op-Amp as, Inverting amplifier, Non-inverting amplifier, voltage follower, summing amplifier, difference amplifier, comparator, integrator, differentiator.

Unit-IV(9 Hours)

5. Data processing circuits: Multiplexers, De-multiplexers, encoders, decoders, Characteristics for Digital ICs -RTL, DTL, TTL, (NAND & NOR Gates).
6. IC 555 Timer -Its pin diagram, internal architecture, Application as astablemulti vibrator and mono stable multi vibrator.

Unit-V (9 Hours)

7. Sequential digital circuits: Flip-flops, RS, Clocked SR, JK, D, T, Master-Slave, Flip-flop,.
8. Code Converters: Design of code converter, BCD to 7 segment, binary/BCD to gray, gray to binary/BCD.

Reference Books

1. Digital Electronics by G.K.Kharate Oxford University Press
2. Unified Electronics by Agarwal and Agarwal.
3. Op- Amp and Linear ICs by Ramakanth A Gayekwad, 4th edition PHI
4. Digital Principles and Applications by Malvino and Leach, TMH, 1996, 4th edition.
5. Digital Circuit design by Morris Mano,PHI
6. Switching Theory and Logic design by A.AnandKumar ,PHI
7. operations amplifier by SV Subramanyam.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI (Model Paper)

Elective Paper –VII-(A):Analog and Digital Electronics

No. of Credits: 03

Note:- Set the question paper as per the blue print given at the end of this model paper.

Time: 3 Hrs. **Max. Marks: 75M**

Section – A

Answer any FIVE questions **5x5= 25M**

1. Draw the symbols of LED, LDR, photo diode, diode and their typical applications.
2. Define CMRR and slew rate.
3. Explain the concept of virtual ground.
4. Draw and explain how the op-Amp acts as voltage follower.
5. Compare different logic families.
6. Calculate V0 for the circuit below for V1=5v and V2=2v.
7. Draw and explain the pin diagram of IC555.
8. Design 2 bit Binary to gray convertor.

Section – B

Answer ALL questions. **5x10=50M**

9. (a) Explain the operation of enhancement MOSFET and draw its drain characteristics.

(or)

(b) Explain the operation of LED and draw its characteristics and state its applications.

10. (a) Explain the block diagram of Op-Amp and differentiate. Ideal and practical characteristics of Op-Amp.

(or)

(b) Explain the characteristics of Op-Amp IC 741.

11. (a) Explain the following applications of Op-Amp.
    i. Inverting amplifier.
    ii. Summing amplifier.

(or)

(b) Explain the op-amp as comparator.

12. (a) State and explain internal architecture of IC 555 and explain its applications as astable multivibrator.

(or)

(b) Explain about TTL NAND and NOR gates.

13. (a) Explain conversion of JK flip flop to D flip flop.

(or)

(b)Explain the design of code convertor

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI (Model Paper)

Elective Paper –VII-(A):Analog and Digital Electronic

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. FET & photo electronic devices	2	1	25
2. Operational amplifier	2	2	30
3. Applications of Op-Amps	2	1+1Problem	30
4. Data processing circuits, IC555 Timers	2	2	30
5. Sequential digital circuits, code convertors	2	1	25
Total			140

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Elective Paper-VII(A) Practical: Analog and Digital Electronics

Credits: 02

2hrs/Week

Minimum of 6 experiments to be done and recorded

1) Characteristics of FET
2) Characteristics of MOSFET
3) Characteristics of LDR
4) Characteristics of Op-amp.(IC741)
5) Op-Amp as amplifier/inverting amplifier
6) Op-Amp as integrator/differentiator
7) Op-Amp as summing amplifier/difference amplifier
8) IC 555 as astable multivibrator
9) IC 555 as monostable amplifier
10) Master slave flip-flop
11) JK flip-flop

AdiKavi Nanayya University::Rajamahendravam

Semester-VI

Elective paper-VII (B)-Material science

No. of Credits: 03
3 Hour/Week
Total Hours: 45

UNIT-I (9 hrs)

1.Materials and Crystal Bonding**:** Materials, Classification, Crystalline, Amorphous, Glasses; Metals, Alloys, Semiconductors, Polymers, Ceramics, Plastics, Bio-materials, Composites, Bulk and nanomaterials. Review of atomic structure – Interatomic forces – Different types of chemical bonds – Ioniccovalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogenbond – Binding energy of a crystal.

UNIT-II (9 hrs)

2. **Defects and Diffusion in Materials**: Introduction – Types of defects - Point defects- Line defects- Surface defects- Volume defects- Production and removal ofdefects- Deformation- irradiation- quenching- annealing- recovery - recrystallization andgrain growth. Diffusion in solids- Fick's laws of diffusion.

UNIT-III(9 hrs)

3. **Mechanical Behavior of Materials**: Different mechanical properties of engineering materials – Creep – Fracture – Technologicalproperties – Factors affecting mechanical properties of a material – Heat treatment - Cold andhot working – Types of mechanical tests – Metal forming process – Powder – Misaligning – Deformation of metals.

UNIT-IV (9 hrs)

4. **Magnetic Materials**:Dia-, Para-, Ferri- and Ferromagnetic materials, Classical Langevin theory of dia magnetism, Quantum mechanical treatment of paramagnetism. Curie's law, Weiss's theory of ferromagnetism, Ferromagnetic domains.Discussion of B-H Curve.Hysteresis and energy Loss.

UNIT-V (9 hrs)

5. **Dielectric Materials**:Dielectric constant, dielectric strength and dielectric loss, polarizability, mechanism of polarization,factors affecting polarization, polarization curve and hysteresis loop, types of dielectric materials, applications; ferroelectric, piezoelectric and pyroelectric materials, Clausius -Mosotti equation.

Reference books

1. Materials Science by M.Arumugam, Anuradha Publishers. 1990, Kumbakonam.
2.Materials Science and Engineering V.Raghavan, Printice Hall India Ed. V 2004. New Delhi.
3. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
4. Solid State Physics, M.A. Wahab, 2011, Narosa Publications

AdiKavi Nanayya University::Rajamahendravam

Semester-VI (Model Paper)

Elective paper-VII (B)-Material science

Section-A

5x5=25M

Answer any FIVE of the following

1. Explain Write's law?
2. Write short note on types of mechanical tests?
3. Explain clasives-Mosotti equation?
4. Explain diffusion in solid-Fick's law of diffusion?
5. Write mechanical properties of engineering material?
6. Define dielectric constant and polarization?
7. The dielectric constant of water is 78? What is its electrical permittivity?
8. How par magnetism can be explained Quantum mechanically explain?

Section-B

Answer ALL Question **5x10=50M**

9 (a) Explain various types of bonds in crystals?Expalin their properties?

(or)

(b)Describe the classification of materials?

10 (a)Write about various types of crystals defectives?

(or)

(b)Briefly explain Hysteresis and also give their loss of energy?

11. (a) Write various mechanical properties of materials?

(or)

(b) Write about mechanical tests?

12. (a) Describe langevin theory of diamagnetism?

(or)

(b) Explain Weiss theory of dia magnetism?

13. (a) Explain What is dielectric polarization? Explain various factors effecting

polarization?

(or)

(b) Discuss various types of dielectric material?

AdiKavi Nanayya University::Rajamahendravam

Semester-VI

Elective paper-VII (B)-Material science

No. of Credits: 03

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Materials and Crystal Bonding	2	2	30
2. Defects and Diffusion in Materials	2	2	30
3. Mechanical Behavior of Materials	2	1	25
4. Magnetic Materials	2	1	25
5. Dielectric Materials	2	1+1(Problem)	30
Total			140

AdiKavi Nanayya University::Rajamahendravam
Semester-VI
Elective paper-VII (B)-Material science

2hrs/Week
Credits : 2

Minimum of 6 experiments to be done and recorded

1. Measurement of susceptibility of paramagnetic solution (Quinck`s Tube Method)
2. Measurement of magnetic susceptibility of solids.
3. Determination of coupling coefficient of a piezoelectric crystal.
4. Measurement of the dielectric constant of a dielectric Materials
5. Study the complex dielectric constant and plasma frequency of metal using surface plasmon resonance (SPR)
6. Study the hysteresis loop of a Ferroelectric Crystal.
7. Study the B-H curve of 'Fe' using solenoid and determine energy loss from hysteresis.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Elective Paper-VII (C) - Renewable Energy

No. of Credits: 03
3 Hour/Week
Total Hours: 45

UNIT-I (9 hrs)

1. Introduction to Energy: Definition and units of energy, power, Forms of energy, Energy flow diagram to the earth. Role of energy in economic and social development.

2. Environmental Effects: Environmental degradation due to energy production and utilization, air and water pollution, depletion of ozone layer, global warming, biological damage due to environmental degradation.

UNIT-II (9hrs)

3. Global Energy Scenario: Energy consumption in various sectors, energy resources, coal, oil, natural gas, nuclear and hydroelectric power.

4. Indian Energy Scene: Energy resources available in India, urban and rural energy consumption, nuclear energy - promise and future, energy as a factor limiting growth, need for use of new and renewable energy sources.

UNIT-III (9hrs)

5. Solar energy: Solar energy, Spectral distribution of radiation, solar water heating system, Applications, Solar cooker. Solar cell, Types of solar cells.

6. Wind Energy: Introduction, Principle of wind energy conversion, Components of wind turbines, Operation and characteristics of a wind turbine, Applications of wind energy.

UNIT-IV (9hrs)

7. Ocean Energy: Introduction, Principle of ocean thermal energy conversion, Tidal power generation, Tidal energy technologies, Energy from waves.

8. Hydrogen Energy: History of hydrogen energy - Hydrogen production methods - Electrolysis of water, Uses of hydrogen as fuel.

UNIT-V (9 hrs)

9. Bio-Energy

Energy from biomass – Sources of biomass – Conversion of biomass into fuels – Energy through fermentation – Pyrolysis, gasification and combustion – Aerobic and anaerobic bio-conversion – Properties of biomass – Properties and characteristics of biogas.

References:

1. Solar Energy Principles, Thermal Collection &Storage, S.P.Sukhatme: Tata McGraw Hill Pub., New Delhi.
2. Non-Conventional Energy Sources, G.D.Rai, New Delhi.
3. Renewable Energy, power for a sustainable future, Godfrey Boyle, 2004,
4. The Generation of electricity by wind, E.W. Golding.
5. Hydrogen and Fuel Cells: A comprehensive guide, Rebecca Busby, Pennwell corporation (2005)
6. Hydrogen and Fuel Cells: Emerging Technologies and Applications, B.Sorensen, Academic Press (2012).
7. Non-Conventional Energy Resources by B.H. Khan, Tata McGraw Hill Pub., 2009.
8. Fundamentals of Renewable Energy Resources byG.N.Tiwari, M.K.Ghosal, Narosa Pub., 2007.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Model Paper

Elective Paper-VII (C) - Renewable Energy

Section-A **5X5 = 25M**

Answer any FIVE of the following.

1. Draw the energy flow diagram to the earth.

2. Write a short note on depletion of ozone layer.

3. Discuss energy consumption in various sectors.

4. Explain energy resources available in India.

5. Write applications of solar cooker.

6. Write any six applications of wind energy.

7. Write the uses of hydrogen as fuel.

8. Write a short note on sources of biomass.

Section-B **5X5 = 25M**

Answer ALL questions.

9. (a) Discuss about role of energy in economic development and social transformation

(or)

9 (b) Briefly discuss about global warming

10.(a) Discuss Global energy resources coal, oil, natural gas nuclear and hydro electric Power.

(or)

(b) Write need for use of new and renewable energy resources

11.(a) Briefly discuss about solar energy and also its applications

(or)

(b) Write the principle of wind energy conversion and also briefly explain for it

12.(a) Briefly explain about tidal energy technologies

(or)

(b) Explain the history of hydrogen energy –Hydrogen production methods

13.(a) Explain Aerobic and anaerobic bio-conversion

(or)

(b) Explain operation, properties and characteristics of biogas

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Elective Paper-VII (C) – Renewable Energy

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Introduction to Energy & Environmental Effects	2	1+1problem/Short Answer	30
2. Global Energy Scenario & Indian Energy Scene	2	1+1problem/Short Answer	30
3. Solar energy & Wind Energy	2	1+1problem/Short Answer	30
4. Ocean Energy & Hydrogen Energy	2	1	25
5. Bio-Energy	2	1	25
Total			140

Adikavi Nannaya University :: Rajamahendravaram

III B. Sc. Physics : Semester-VI Elective Paper-VII C-Practical
Renewable Energy

2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Preparation of copper oxide selective surface by chemical conversion method.
2. Performance testing of solar cooker.
3. Determination of solar constant using pyrheliometer.
4. Measurement of I-V characteristics of solar cell.
5. Study the effect of input light intensity on the performance of solar cell.
6. Study the characteristics of wind.
7. Study the characteristics of photocell

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Paper –VIII-(A1)

Introduction to Microprocessors and Microcontrollers

No. of Credits: 03
3 Hour/Week
Total Hours: 45

w.e.f : 2017-2018

Unit – I (9Hours)

1. Introduction to microcontrollers: architecture of embedded system, applications and purposes, challenges and designs, elemental description of embedded processors and micro controllers.

Unit –II (9Hours)

2. Microprocessors: 8085 microprocessor,its pin diagram, concept of data bus, and address bus, 8085 programming, instruction classification, stacks and its implementation, hardware and software interrupts.

Unit– III (9 Hours)

3. 8051 microcontroller:Introduction , block diagram, assembly language programming, programme counter, ROM memory, data types and directives, flag bits, PSW register, arithmetic and logic instructions, jump, loop and call constructions.

Unit – IV (9 Hours)

4. Timers:Programming of 8051 timers, counter programming.
Embedded system programming:Structure of programming, infinite loop, compiling, and debugging.

Unit –V (9Hours)

5. Embedded system design and development:Embedded system development environment, file type generated after cross compilation, dissembler, simulator and debugging. Embedded product life cycle: Embedded product development life cycle.

Reference Books

1) Embedded Systems.. Architecture,programming and design, R Kamal, 2008, TMH
2) The 8051 micro controller and embedded systems using Assembly and C, M.A.Mazidi,
J.G.Mazidi and R.D.McKinlay, second Ed., 2007 pearson Education India
3) Introduction to embedded systems K.V. Shibu, 1st edition, 2009 McGraw Hill
4) Micro Controllers in practice, I Susnea and Mitescu,2005,springer

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI (Model Paper)

Cluster Paper –VIII-(A1)

Introduction to Microprocessors and Microcontrollers

Microcontrollers

No. of Credits: 03

Note:- Set the question paper as per the blue print given at the end of this model paper.

Time: 3 Hours **Max Marks: 75M**

Section – A

Answer any FIVE questions **5x5= 25M**

1. Classify different types of microprocessors.
2. Explain flag register of 8085 microprocessor.
3. Write an assembly language program for addition of two 8-bit numbers with the help of flow chart.
4. Explain any four directives of 8085.
5. Write an assembly language program for factorial of a given 8-bit number.
6. Briefly explain intercepts of 8085.
7. Explain the process of interrupt service routine (ISR).
8. Define dissembler & simulator.

Section – B

Answer ALL questions. **5x10=50M**

9. (a) Draw & explain the architecture of embedded system.

   (or)

   (b) Explain elemental description of embedded processors and Microcontrollers.

10. (a) Draw the pin diagram of 8085 microprocessor &explain each pin function.

    (or)

    (b) Define instruction & explain instruction set of 8085 microprocessor.

11. (a) Interface ROM to the 8051 microcontroller with the help of example.

(or)

(b) write the block diagrm of 8051 microcontroller and explain.

12. (a) Explain any 5 arithmatic instruction with examples.

(or)

(b) Draw and explain the TMOD register of a 8051 microcontroller.

13. (a) Explain the process of embedded product development life cycle in detail.

(or)

(b) What are files generate after order compilation & explain every file.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Paper –VIII-(A1)

Introduction to Microprocessors and Microcontrollers

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
Introduction to microcontrollers	2	1	25
Microprocessors	2	1+1problem	30
8051 microcontroller	2	1+1problem	30
Timers	2	2	30
Embedded system	2	1	25
Total			140

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Paper –VIII-(A1)

Practical: Introduction to Microprocessors and Microcontrollers

Credits: 2
2hrs/Week

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's.
5. Program to glow first four LED then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left.
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. To toggle '1234' as '1324' in the seven segment LED.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement, some information on LCD display, interfacing a keyboard.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A2

Computational Methods and Programming

3 Hour/Week

Total Hours: 45

w.e.f : 2017-2018

UNIT-I (9hrs)

1. Fundamentals of C language: C character set-Identifiers and Keywords-Constants - Variables- Data types-Declarations of variables-Declaration of storage class-Defining symbolic constants- Assignment statement.
2. Operators: Arithmetic operators-Relational operators-Logical operators-Assignment operators- Increment and decrement operators-Conditional operators.

UNIT-II (9hrs)

3. Expressions and I/O Statements: Arithmetic expressions-Precedence of arithmetic operators- Mathematical (Library) functions - Data input and output-Scanf-Printf simple programs.
4. Decision Control statements: If -Else statements -Switch statements - The operators - GO TO

UNIT-III (9hrs)

Iterative Statements(or) Loops: While, Do - While, FOR statements - BREAK and CONTINUE statements.

5. Arrays: One dimensional and two dimensional arrays - Initialization - Type declaration - Inputting and outputting of data for arrays - Programs of matrices addition, multiplication.

UNIT-IV (9hrs)

6. User defined functions: The form of C functions - Return values and their types - Calling a function - Category of functions.Recursion.ANSI C functions- Function declaration. Scope and life time of variables in functions.

7. Linear equations: Solution of Algebra and transcendental equations- -Rhapson method-Basic principles-Formulae- algorithms

UNIT-V (9hrs)

8. Interpolations: Concept of linear interpolation-Finite differences-Newton's and Lagrange's interpolation formulae-principles and Algorithms

9. Numerical differentiation : Numerical differentiation-algorithm for evaluation of first order derivatives using formulae based on Taylor's series.

Reference Books

1. Introductory methods of Numerical Analysis: Sastry
2. Numerical Methods: Balaguruswamy
3. Programming in ANSI C (TMH) : Balaguruswamy
4. Programming with 'C'- Byron Gottafried, Tata Mc Graw Hill

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A2

Computational Methods and Programming

No. of Credits: 03

Note:- Set the question paper as per the blue print given at the end of this model paper.

Time: 3 Hours **Max Marks: 75M**

Section – A

Answer any FIVE questions **5x5= 25M**

1. Explain Data types in C language
2. Write a C program for converting Centigrade to Fahrenheit temperature with output.
3. Explain break and continue statements in C language
4. Explain about Input and Output functions in C.
5. Write a program to find the factorial of a given number.
6. Write a program to sort the array elements
7. Explain Linear Equations.
8. Explain the concept of Linear Interpolation.

Section – B

Answer any FIVE questions. **5x10=50M**

9. (a) Explain any Five Types of Operators in C language with examples.

(or)

(b) What are the storage classes available in "C" ? Explain.

10. (a) Explain Input/Output (I/O) statements (functions) in C language with examples.

(or)

(b) Explain Conditional control statements (IF, IF-ELSE, ELSE-IF) with examples.

11. (a) Explain different types of Iterative Statements with example.

(or)

(b) Write a C program for multiplication of two matrices.

12. (a) What is Function? Explain different Categories of functions

(or)

(b) Explain about Rhapson methods

13. (a) Explain Lagrange's Interpolation Algorithm with an example.

(or)

(b) Explain Algorithm for evaluation of First Order Derivatives using Taylor's series.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A2

Computational Methods and Programming

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Fundamentals of C language & Operators	2	1	25
2.Expressions and I/O Statements & Control Statements	2	1+1program	30
3.Arrays & User-Defined Functions	2	1+2program	35
4.Linear & Non-Linear Equations & Simultaneous Equations	2	1	25
5.Interpolations&Numerical Differentiation & Integration	2	1	25
Total			140

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A2

Practical: Computational Methods and Programming

Credits: 2
2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Write a program that reads an alphabet from keyboard and display in the reverse order.
2. Write a program to read and display multiplication of tables.
3. Write a program for converting centigrade to Fahrenheit temperature and Fahrenheit temperature centigrade.
4. Write a progrType equation here.4. Write a program to find the largest element in an array.
5. Write a program based on percentage calculation, the grade by entering the subject marks. (If percentage > 60 I class, if percentage between 50&60 II class, if percentage between 35&50 III class, if percentage below 35 fail).
6. Write a program for generation of even and odd numbers up to 100 using while, do-while and for loop.
7. Write a program to solve the quadratic equation using Bisection method.
8. Write a program for integration of function using Trapezoidal rule.
9. Write a program for solving the differential equation using Simpson's $1/3_{rd}$ rule.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A3

Electronic Instrumentation

3 Hour/Week

Total Hours: 45

w.e.f : 2017-2018

Unit – I (9Hours)

1. Basics of measurements: Multimeter , principles of measurement of dc voltage and dc currents, ac current and resistance, specifications of multimeter and their significance.

Unit -11 (9 Hours)

2. Electronic Voltmeter:Advantage over conventional multimeter for voltage measurement with respect to input impedence and sensitivity, principles of voltage measurement (block diagram only), specification of an electronic voltmeter/multimeter and their significance.

Unit– III (9 Hours)

3. CRO : Block diagram of basic CRO, construction of CRT.

Applications CRO: Measurement of voltage dc and ac, frequency,

digital storage oscilloscope: block diagram , principle and working.

Unit – IV (9 Hours)

4. Digital Multimeter: Block diagram,working, frequency measurement using universal counter, frequency counter.

Digital instruments: Principle and working of digital instruments, working principle of digital voltmeter.

Unit – V (9 Hours)

5. Signal generators: Block diagram explanation, specifications of low frequency signal generators, pulse generator, function generator-working, Distortion factor meter, wave analysis.

Bridges: Block diagram, working of basic LCR bridge working.

Reference Books

1. A text book in electrical technology by B.L.Thereja (S.Chand&Co)
2. Digital circuits and systems by Venugopal 2011 (Tata Mcgraw Hill)
3. Digital Electronics by SubrathaGhoshal 2012 (Cengage Learning)

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI (Model Paper)

Cluster Elective Paper VIII-A3

Electronic Instrumentation

No. of Credits: 03

Note:- Set the question paper as per the blue print given at the end of this model paper.

Time: 3 Hours **Max Marks: 75M**

Section – A

Answer any FIVE questions **5x5= 25M**

1. Give any ten specifications of multimeter.
2. The expected value of the voltage across a resistor is 80v. however, the measurement gives a value of 79v. calculate
   i) Absolute error
   ii) % error
   iii) Related accuracy
   iv) % of accuracy
3. Write the advantages and performance characteristics of electronic voltmeters.
4. Draw the block diagram of basic CRO and explain each block.
5. Explain how frequency can be measured by a CRO using lissajous figures.
6. Draw the block diagram of ramp type DVM.
7. Mention any five requirements of a pulse of pulse generator.
8. Explain the working of distortion factor meter.

Section – B

Answer ALL questions. **5x10=50M**

9. (a) Explain basic DC voltmeter and derive the expression for series resistance (Rs). Calculate the value of multiplier resistance on the 50v range of a DC voltmeter that causes a 500μA meter movement with an internal resistance.

   (or)

   (b) Explain the specifications of multimeter and their significance.

10. (a) Draw and explain permanent magnetic moving coil (PMMC) movement.

    (or)

    (b) Explain the advantage of electronic voltmeter over conventional multimeter for voltage measurement with respect to input impedence and sensitivity.

11. (a) Draw and explain about cathode ray tube(CRT).

    (or)

    (b) Draw and explain the block diagram of digital storage oscilloscope.

12. (a) Draw and exp[lain the block diagram of universal counter.

(or)

(b) Explain with a diagram the basic principle of operation of digital time measurement.

13. (a) What is a LCR meter? How can L,C and R be measured using a Skelton LCR bridge.

(or)

(b) Define wave analyzer, list different types of wave analyzers and explain with a diagram the operation of a basic wave analyzer.

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A3

Electronic Instrumentation

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Basic of measurements	2	2	30
2. Electronic Voltmeter	2	1	25
3. CRO	2	2	30
4. Digital Multimeter & Digital instruments	2	1	25
5. Signal generators, Bridges	2	2	30
Total			140

AdiKavi Nanayya University::Rajamahendravam

III B.Sc. Physics Semester-VI

Cluster Elective Paper VIII-A3

Practical: Electronic Instrumentation

Credits: 02

2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Study the loading effect of a multimeter by measuring voltage across alow and high resistance.
2. Study the limitations of a multimeter for measuring high frequency voltageand currents.
3. Measurement of voltage, frequency, time period and phase angle using CRO.
4. Measurement of time period and frequency using universal counter/frequency counter.
5. Measurement of rise, fall and delay times using a CRO.
6. Measurement of distortion of a RF signal generator using distortion factor meter.
7. Measurement of R, L and C using a LCR bridge/ universal bridge.

(OR)

Project

AdiKavi Nanayya University::Rajamahendravaram

Semester-VI

Cluster Paper VIII-B1: Fundamentals of Nanoscience

No. of Credits: 03

3 Hour/Week
Total Hours: 45

UNIT-I (9hrs)

1. Background and history: Emergence of Nanoscience with special reference to Feynman and Drexler; Role of particle size; Spatial and temporal scale; Concept of confinement, strong and weak confinement with suitable example; Development of quantum structures, Basic concept of quantum well, quantum wire and quantum dot.

Finite size Zero, One and Two Dimensional Nanostructures, Concept of Surface and Interfacial Energies. Physics of the solid state – size dependence of properties, crystal structures, Lattice vibrations, Energy bands:- Insulators Semiconductors and conductors.

UNIT-II (9hrs)

2. Classification of Nanomaterials: Inorganic nanomaterials: carbon nanotubes and cones, Organic nanomaterials: dendrimers, micelles, liposomes, block copolymers; Bionanomaterials: Biomimtric, bioceramic and nanotherapeutics; Nanomaterials for molecular electronics and optoelectronics.

UNITS-III (9hrs)

3. Macromolecules: Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization. Molecular weight of polymers-number average and weight average molecular weight, degree of polymerization, determination of molecular weight of polymers by viscometry,

UNIT-IV (9hrs)

4. Molecular & Nanoelectronics: Semiconductors, Transition from crystal technology to nanotechnology. Tiny motors, Gyroscopes and accelerometers. Nano particle embedded wrinkle resistant cloth, Transparent Zinc Oxide sun screens.

UNIT-V (9hrs)

5. Biomaterials: Implant materials: Stainless steels and its alloys, Ti and Ti based alloys, Ceramic implant materials; Hydroxyapatite glass ceramics, Carbon Implant materials, Polymeric Implant materials, Soft tissue replacement implants, Sutures, Surgical tapes and adhesives, heart valve implants, Artificial organs, Hard Tissue replacement Implants, Internal Fracture Fixation Devices, Wires, Pins, and Screws, Fracture Plates.

Reference Books

1. T. Pradeep: Textbook of Nanoscience and Nanotechnology Chapter (McGraw-Hill Professional, 2012), Access Engineering.
2. C. N. R. Rao, A. Mu¨ller, A. K. Cheetham, "The Chemistry of Nanomaterials :Synthesis, Properties and Applications", Wiley-VCH, 2006.
3. C. Breachignac P. Houdy M. Lahmani, "Nanomaterials and Nanochemistry", Springer, 2006.
4. Guozhong Cao, "Nanostructures and Nanomaterials: Synthesis, Properties, and Applications", World Scientific Publishing Private, Ltd., 2011.
5. Zhong Lin Wang, "Characterization of Nanophase Materials", Wiley-VCH, 2004.
6. Carl C. Koch, "Nanostructured Materials: Processing, Properties and Potential Applications", William Andrew Publishing Norwich, 2006.

AdiKavi Nanayya University::Rajamahendravaram

Semester-VI (Model Paper)

Cluster paper-VIII-(B1) Fundamental of Nanoscience

Section-A

Answer any FIVE of the following **5x5=25M**

1. Define insulators, semi conductors and conductors ?
   విద్యుత్ నిరోధకాలు అర్ధవాహకాలు మరియు వాహకాలను నిర్వచించుము.
2. Write about crystal structures?
   స్పటిక నిర్మాణమును గూర్చి వ్రాయుము.
3. Briefly explain Bionano materials?
   జీవనో పదార్థాలు గూర్చి వ్రాయుము.
4. Write the molecular weight of polymers?
   పోలిమెర్ యొక్క అణుభారమును తెల్పుము.
5. Write the applications of polyethylene?
   పోలిథీన్ యొక్క అనువర్తనాలను తెలుపుము.
6. Explain about Teflon?
   టెఫ్లోన్ గూర్చి వ్రాయుము.
7. Explain single electron transistors?
   ఏక ఎలక్ట్రోన్ ట్రాన్సిస్టర్‌ను గూర్చి వ్రాయుము.
8. Discuss about stainless stells and its alloys?
   స్టెయిన్ లెస్ స్టీల్ మరియు దాని మిశ్రమలోహాలను వివరించుము.

Section-B

Answer ALL the Questions **5x10=50M**

9. (a) Basic concept of quantum well and also write development of quantum structures?
   క్వాంటం యొక్క ప్రాధమిక ఆదారము మరియు క్వాంటం నిర్మాణము యొక్క వృద్ధిని గూర్చి తెలుపుము.

   (or)

   (b) Explain one dimensional and two dimensional Nanostructures?
   నానో నిర్మాణము యొక్క ఏక మరియు ద్విమితీయ నిర్మాతను గూర్చి వ్రాయుము.
10. (a) Write about carbon Nano tubes and lones?
    కార్బన్ యొక్క నానో గొట్టము మరియు లోన్స్ గూర్చి తెలుపుము.

    (or)

    (b) Explain Nano materials for molecular electronics and opto electronics?
    నానో పదార్థాల యొక్క అణు ఎలక్ట్రానిక్స్ మరియు ఆప్టో ఎలక్ట్రానిక్స్‌ను వివరించుము.
11. (a) Discuss step polymerization and coordination polymerization with one example each?
    స్టేప్ పోలిమెరీకరణము మరియు సమన్వయ పోలిమెరికరణమును ఒక ఉదాహరణతో వ్రాయుము.

    (or)

    (b) Explain Determination of molecular weight of polymers by viscometry and osmoetry?
    స్థితిస్థాపత మరియు ద్రవాభిసర పద్ధతి ద్వారా పొలిమెరు యొక్క అణుభారమును నిర్ణయించుము.
12. (a) Briefly explain about semiconductors?
    అర్ధ వాహకాలు గూర్చి వ్రాయుము.

    (or)

    (b) Explain construction and working of Gyroscopes?
    గైరోస్కాపిక్ నిర్మాణము మరియు పనిచేయు విధానమును వివరించుము.
13. (a) Briefly explain carbon implant material and polymise implant materials?
    కార్బన్ ఇంప్లేంట్ మరియు పోలిమైస్ ఇంప్లెంట్ పదార్థాల గూర్చి వ్రాయుము.

    (or)

    (b) Write about soft tissues and Hard tissues replacement implants?
    మృధు కణజాలాలు, కఠిన కణజాలలను ఏ విధముగా స్థానగమనము చెందిస్తారు.

AdiKavi Nanayya University::Rajamahendravaram

Semester-VI
Cluster paper-VIII-(B1) Fundamental of Nanoscience

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Background and history	2	1	25
2. Classification of Nanomaterials	2	1+1problem/Short Answer	30
3. Macromolecules	2	1+1 problem/Short Answer	30
4. Molecular & Nanoelectronics	2	1+1 problem/Short Answer	30
5. Biomaterials	2	1	25
Total			140

AdiKavi Nanayya University::Rajamahendravaram

Semester-VI
Cluster paper-VIII-(B1) Fundamental of Nanoscience
Practical: Fundamentals of Nanoscience

Credits: 02

2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Determination of the Band Gap of Semiconductor Nanoparticles.
2. Surface Enhanced Raman Scattering Activity of Silver Nanoparticles
3. Conversion of Gold Nanorods into Gold Nanoparticles
4. Bimetallic Nanoparticles
5. Processing and Development of Nanoparticle gas sensor
6. Magnetic separation/identification studies of nanoparticles
7. Harvesting light using nano-solar cells
8. Nano-Forensic analysis to identify, individualize and evaluate evidence using nanophase materials
9. Comparison of the performance of nanoparticles based conductive adhesives and conventional non conductive adhesives.
10. Electrodeposition and corrosion behavior of nanostructured composite film
11. Photocatalytic activity of nanomaterials

AdiKavi Nanayya University::Rajamahendravaram

III B. Sc. Physics : Semester VI

Semester-VI Cluster paper-VIII (B2)

Synthesis and characterization of Nanomaterials

No. of Credits: 03

3 Hour/Week
Total Hours: 45

Unit-I (9 hrs)

1. Nanomaterials synthesis: Synthesis and nanofabrication, Bottom-Up and Top-Down approach with examples. Chemical precipitation methods, sol-gel method, chemical reduction, hydrothermal, process. Physical Mehtods- ball milling, Physical Vapour deposition (PVD), Sputtering, ChemicalVapor deposition (CVD), pray pyrolysis,

Unit-II (9 hrs)

2. Classification of materials: Types of materials, Metals, Ceramics (Sand glasses) polymers, composites, semiconductors.Metals and alloys- Phase diagrams of single component, binary and ternary systems, diffusion, nucleation and growth.

UNITS-III (9 hrs)

3. Glasses: The glass transition - theories for the glass transition, Factors that determine the glass-transition temperature. Glass forming systems and ease of glass formation, preparation of glass materials.Applications of Glasses: Introduction: Electronic applications, Electrochemical applications, optical applications, Magnetic applications.

UNITS-IV (9 hrs)

4. Liquid Crystals: Mesomorphism of anisotropic systems, Different liquid crystalline phase and phase transitions, Thermal and electrical properties of liquid crystals, Types Liquid Crystals displays, few applications of liquid crystals.

UNITS-V (9 hrs)

5. Characterization Methods: XRD, SEM, TEM, AFM, XPS and PL characterization techniques for nano materials.

References books

1. Encyclopedia of Nanotechnology by M.Balakrishna Rao and K.Krishna Reddy, Vol.I to X, Campus books.
2. Nano: The Essentials-Understanding Nanoscinece & Nanotechnology by T.Pradeep; Tata Mc. Graw Hill
3. Nanotechnology in Microelectronics & Optoelectronics, J.M Martine Duart, R.J Martin Palma, F. Agullo Rueda, Elsevier
4. Nanoelectronic Circuit Design, N.K Jha, D Chen, Springer
5. Handbook of Nanophysics- Nanoelectronics & Nanophotonics, K.D Sattler, CRC Press
6. Organic Electronics-Sensors & Biotechnology- R. Shinar & J. Shinar, McGraw-Hill

AdiKavi Nanayya University::Rajamahendravaram

III B. Sc. Physics : Semester VI

(Model Paper)

Cluster paper-VIII (B2) Synthesis and characterization of Nano materials

Section-A

Answer any FIVE of the following **5x5=25M**

1. Write short note on physical vapour deposition?
   భౌతిక బాష్ప నిక్షిప్తము గూర్చి తెలుపుము.
2. Write the uses of proteins?
   ప్రొటీన్స్ యొక్క ఉపయోగాలను తెలపుము.
3. Write down the DNA templates?
   DNA టెంప్లేట్స్ గూర్చి వ్రాయుము.
4. Write any five properties of electrical and magnetic material?
   విద్యుత్ మరియు అయస్కాంత పదార్థాల యొక్క ఎవైన 5 ధర్మాలను వ్రాయుము.
5. Give th application of optical glasses?
   దృవణ గాజు యొక్క అనువర్తనాలను తెలపుము.
6. Give the electro chaemical applications?
   విద్యుత్ రసాయన అనువర్తనాలను వ్రాయుము.
7. Write properties of liquid crystals?
   ద్రవ స్పటికాల యొక్క ధర్మాలను తెలుపుము.
8. Any five application of liquid crystals?
   ద్రవ స్పటికాల యొక్క అనువర్తనాలను వ్రాయుము.

Section-B

Answer ALL the questions **5x10=50M**

9.(a)Briefly explain Bottom-up and Top-down approach with examples?
   క్రింద నుండి పైకి, పై నుండి క్రిందకు మారే విధానమును ఉదాహరణతో వివరించుము.

(or)

(b)Write about Biological methods-synthesis using micro organisms and bacteria?
   సూక్ష్మ కర్బన మరియు బాక్టీరియానుపయోగించి జీవవారణ విధానము మరియు సంశ్లేషణము గూర్చి వివరించుము.

10. (a) Explain types of materials?
    ముడి పదార్థాలలోని వివిధ రకాలను తెలుపుము.

(or)

(b) Discuss about diffusion and diffusion less transformation?
    వ్యాపనము మరియు వ్యాపనము తక్కువగా మార్పిడిని వివరించుము.

11.(a) Discuss the factors that determine the glass transition temperature?
    గాజు యొక్క పరివర్త ఉష్ణోగ్రతపై చూపే ప్రభావాలను తెలుపుము.

(or)

(b) Briefly explain glass forming systems and case of glass formation?
    గాజు ఏర్పడే వ్యస్థను మరియు గాజు ఏర్పడుటను వివరించుము.

12. (a) Explain various types of liquid crystals
    ద్రవ స్పటికమునందు వివిధ రకములను తెల్పుము.

(or)

(b) Explain different liquid crystalline phase &phase transitions?
    వివిధ రకాల ద్రవ స్పటిక ప్రావస్థ మరియు పరివర్తన ప్రావస్థను వివరించుము.

13.(a) Write about XRD, SEM, TEM, AFM and PL characterization techniques for nano materials?
    నానో పదార్థాముల యొక్క XRD, SEM, TEM, AFM మరియు PL లక్షణముల గూర్చి వ్రాయుము.

(or)

(b) Briefly explanation about optical properties by IR and Raman spectroscopy?
    IR మరియ రామన్ వర్ణపటము యొక్క దృవణ ధర్మాలను వివరింపుము.

AdiKavi Nanayya University::Rajamahendravaram

III B. Sc. Physics : Semester VI

Semester-VI Cluster paper-VIII (B2)

Synthesis and characterization of Nanomaterials

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Nanomaterials synthesis	2	1	25
2. Classification of materials	2	1+1problem/Short Answer	30
3. Glasses	2	1	25
4. Liquid Crystals	2	1+1problem/Short Answer	30
5. Characterization Methods	2	1+1problem/Short Answer	30
Total			140

AdiKavi Nanayya University::Rajamahendravaram

III B. Sc. Physics : Semester VI

Semester-VI Cluster paper-VIII (B2)

Practical: Synthesis and Characterization of Nanomaterials

Credits: 02

2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Synthesis of nanocrystalline films of II-VI compounds doped with rare earths by chemical process.
2. Synthesis of Alkaline earth aluminates in nanocrystalline form by combustion synthesis.
3. Preparation of surface conducting glass plate by spray pyrolysis method
4. Preparation of surface conducting glass plate by chemical route
5. Fabrication of micro fluidic nanofilter by polymerisation reaction
6. Absorption studies on the nanocrystalline films and determination of absorption coefficient.
7. Determination of band gap from the absorption spectra using Tauc's plots.
8. Study of Hall effect in semiconductors and its application in nanotechnology.
9. Measurement of electrical conductivity of semiconductor film by Four Probe method and study of temperature variation of electrical conductivity.

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. Physics : Semester VI

Cluster paper-VIII (B3) Applications of Nano materials and Devices

No. of Credits: 03
3 Hour/Week
Total Hours: 45

UNIT-I (9 hrs)

1. **Optical properties:** Coulomb interaction in nanostructures. Concept of dielectric constant for nanostructures and charging of nanostructure.Quasi-particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals. Quantitative treatment of quasi-particles and excitons, charging effects.
2. **UNIT-II (9 hrs)**

2. Electrical transport:

Carrier transport in nanostrcutures.Hall effect, etermination of carrier mobility and carrier concentration; Coulomb blockade effect, thermionic emission, tunneling and hoping conductivity. Defects and impurities: Deep level and surface defects.

UNIT-III (9 hrs)

3.Applications: Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells). Single electron transfer devices (no derivation). CNT based transistors. Nanomaterial Devices: Quantum dots heterostructures lasers, optical switching and optical data storage.

UNIT-IV(9 hrs)

4. Nanoelectronics: Introduction, Electronic structure of Nanocrystals,Tuning the Band gap of Nanoscale semiconductors, Excitons, Quantumdot, Single electron devices, Nanostructured ferromagnetism,Effect of bulk nanostructuring of magnetic properties,

UNIT-V (9 hrs)

5. Nanobiotechnology and Medical application: Introduction, Biological building blocks-size of building blocks and nanostructures, Peptide nanowires and protein nanoparticles, DNA double nanowires, Nanomaterials in drug delivery and therapy, Nanomedicine, Targeted gold nanoparticles for imaging and therapy.

Reference books:

1.C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).

2.S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company).

3. K.K. Chattopadhyay and A.N. Banerjee, Introduction to Nanoscience & Technology (PHI Learning Private Limited).

4. Richard Booker, Earl Boysen, Nanotechnology (John Wiley and Sons).

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. Physics : Semester VI

(Model Paper)

Cluster paper-VIII (B3) Applications of Nano materials and Devices

Section-A **5x5=25M**

Answer any of FIVE of the following.

1.write the optical properties of hetro structures and nana materials?
నానో పదార్థాలు మరియు విజాతీయ నిర్మాణాలు యొక్క దృవణ ధర్మాలను తెలపుము.

2. Explain columbo interaction in nanostructure?
నానో నిర్మాణమునందు ఉన్న కొలుంబ ఆకర్షణను తెలుపుము.

3.Explain coulomb blockade effect?
కొలుంబ బ్లాకెడ్ ప్రభావమును వ్రాయుము.

4. Write the application of nano particles?
నానో కణాలు యొక్క అనువర్తనాలను తెల్పుము.

5. Explain single electron transfer devices?
ఏక ఎలక్ట్రాన్ మార్పిడి విధానము వ్రాయుము.

6. Discuss dynamics of nano materials?
నానో పదార్థముల గమనమును గూర్చి వ్రాయుము.

7. Explain Nano medicine?
నానో మందులను వివరించుము.

8. Discuss single electron device in Nano electronics?
నానో ఎలక్ట్రానిక్స్‌నందు ఏక ఎలక్ట్రానును తెలుపుము.

Section-B

Answer All questions **5x10=50M**

9. (a) Explain the concept of dielectric constant for nano structures and charging of nano structure?
నానో నిర్మాణము యొక్క ద్వివిద్యుత్ స్థిరాంకము మరియు ఆవేశమును గూర్చి వివరించుము.

(or)

(b) Write about Quantative treatment of quasi-particles and excitims?
క్వాసి కణములు మరియు ఉద్రిక్తతను గణపరిమాణత్మకతను గూర్చి వివరించుము.

10. (a) Briefly explain about Hall effect?
హాల్ ప్రభావము గూర్చి వ్రాయుము.

(or)

(b) Determination of carrier mobility and carrier concentration?
మోసికొనుపోవు కదలిక మరియు మోసుకొను గాఢతను వివరించుము.

11. (a) Explain optical switching and optical data storage?
ధృవణ స్విచ్చింగ్ మరియు ధృవణ నిల్వలను వివరించుము.

(or)

(b) Briefy explaination about Nano electro mechanical system(NEMS)?
నానో విద్యుత్ యాంత్రిక వ్యవస్థను తెలుపుము.

12.(a) Write about electric structure of Nano crystals?
నానో స్పటికము యొక్క విద్యుత్ నిర్మాణమును గూర్చి వివరించుము.

(or)

(b) Explain spintronics, spintronics device and also write its applications?
భ్రమణాత్మకత – భ్రమణాత్మకతను మరియు దాని అనువర్తనాలను వివరించుము.

13.(a) Draw the Biological building blocks size of building blocks and nano structures?
నానో నిర్మాణము మరియు బిల్డింగ్ బ్లాక్స్ యొక్క జీవావరణ బిల్డింగ్ బ్లాక్ పరిమాణమును వ్రాయుము.

(or)

(b) Explain Nano material in drug delivery and therapy?
మందుల ఇచ్చుట మరియు థెరపినందు నానో పదార్థాలను గూర్చి వివరించుము.

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. Physics : Semester VI

Cluster paper-VIII (B3) Applications of Nano materials and Devices

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Optical properties	2	1+1problem/Short Answer	30
2. Electrical transport	2	1	25
3. Applications	2	1+1problem/Short Answer	30
4. Nanoelectronics	2	1	25
5. Nanobiotechnology and Medical application	2	1+1problem/Short Answer	30
Total			140

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc. Physics : Semester VI

Cluster paper-VIII (B3) Practical

Applications of Nano materials and Devices

2hrs/Week

Credits: 02

Minimum of 6 experiments to be done and recorded

1. Synthesis of metal nanoparticles by chemical route.
2. Synthesis of semiconductor nanoparticles.
3. Surface Plasmon study of metal nanoparticles by UV-Visible spectrophotometer.
4. XRD pattern of nanomaterials and estimation of particle size.
5. To study the effect of size on color of nanomaterials.
6. Prepare a disc of ceramic of a compound using ball milling, pressing and sintering, and study its XRD.
7. Fabricate a thin film of nanoparticles by spin coating (or chemical route) and study transmittance spectra in UV-Visible region.
8. Fabricate a pn-diode by diffusing Al over the surface of n-type Si and study its I-V characteristics.

(OR)

PROJECT

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII C1 Solar Thermal and Photovoltaic Aspects

No. of Credits: 03
3 Hour/Week
Total Hours: 45

UNIT-I (9 hrs)

1. Basics of Solar Radiation: Structure of Sun, Solar constant, Concept of Zenith angle and air mass, Definition of declination, hour angle, solar and surface azimuth angles; Direct, diffuse and total solar radiation, Solar intensity measurement –pyrheliometer.

2. Radiative Properties and Characteristics of Materials: Kirchoff's law – Relation between absorptance, emittance and reflectance; Selective Surfaces - preparation and characterization, Types and applications; Anti-reflective coating.

UNIT-II (9 hrs)

3. Flat Plate Collectors (FPC) : Description of flat plate collector, Liquid heating type FPC, Energy balance equation,Efficiency, Temperature distribution in FPC, Definitions of fin efficiency and collector efficiency, Evacuated tubular collectors.

Unit-III (9 hrs)

4. Solar photovoltaic (PV) cell: Physics of solar cell –Type of interfaces, homo, hetero andschottky interfaces, Photovoltaic Effect, Equivalent circuit of solar cell, Solar cell output parameters, Series and shunt resistances and its effect on cell efficiency; Variation of efficiency with band-gap and temperature.

UNIT-IV (9 hrs)

Solar PV systems: Solar cell module assembly – Steps involved in the fabrication of solar module, Module performance, I-V characteristics, Modules in series and parallel, Module protection –Solar PV system and its components, PV array, inverter, battery and load.

UNIT-V (9 hrs)

Solar thermal applications: Solar hot water system (SHWS), Types of SHWS, Standard method of testing the efficiency of SHWS; Passive space heating and cooling concepts, Solar desalinator and drier, Solar thermal power generation.

Reference Books:

1. Solar Energy Utilization, G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modeling and applications, G.N. Tiwari, Narosa Pub., 2005.
3. Solar Energy-Principles of thermal energy collection & storage, S.P. Sukhatme,TataMc-Graw Hill Publishers, 1999.
4. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,
5. Science and Technology of Photovoltaics, P. Jayarama Reddy, BS Publications, 20

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VII (C1) Solar Thermal and Photovoltaic Aspects

Section-A **5X5 = 25M**

Answer any FIVE of the following.

1. Write short note on selective surfaces preparation and characterization

2. Define solar constant also derive the value for solar constant

3. Write the definition for fin efficiency and collector efficiency

4.Write a short note on solar cells.

5. Discuss various types of interfaces

6. Write about solar module protection.

7. Discuss various types of SHWS (Solar Hot Water Systems).

8.Write short note on solar drier.

Section-B **5X10= 50M**

Answer ALL questions.

9. (a)Briefly explain about pyro heliometers

(or)

(b) Define Kirchhoff's law and also derive the relation between absorptance, emittance and reflectance

10. (a).Discuss about temperature distribution in FPC

(or)

(b) Briefly explain about liquid heating type FPC.

11. (a) Explain variation of efficiency with band –gap and temperature

(or)

(b) Define Photo Voltaic Effect. Write the equivalent circuit of Solar Cell.

12. (a) Write down the steps involved in the fabrication of solar module

(or)

(b) Explain solar PV system and also write its components

13. (a) Explain solar hot water system (SHWS).

(or)

(b) Explain Solar thermal power generation.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII (C1) Solar Thermal and Photovoltaic Aspects

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. **Basics of Solar Radiation & Radioactive Properties and Characteristics of Materials**	2	1+1problem/Short Answer	30
2. **Flat Plate Collectors (FPC)**	2	1	25
3. **Solar photovoltaic (PV) cell**	2	1+1problem/Short Answer	30
4. **Solar PV systems**	2	1	25
5. **Solar thermal applications**	2	1+1problem/Short Answer	30
Total			140

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII (C1) Practical

Solar Thermal and Photovoltaic Aspects

Credits: 02

2hrs/Week

Minimum of 6 experiments to be done and recorded.

1. Measurement of direct solar radiation using pyrheliometer.
2. Measurement of global and diffuse solar radiation using pyranometer.
3. Measurement of emissivity, reflectivity and transsivity.
4. Measurement of efficiency of solar flat plate collector.
5. Performance testing of solar air dryer unit.
6. Effect of tilt angle on the efficiency of solar photovoltaic panel.
7. Study on solar photovoltaic panel in series and parallel combination.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII C2 - Wind, Hydro and Ocean Energies

No. of Credits: 03
3 Hour/Week
Total Hours: 45

UNIT-I(9hrs)

1. **Introduction:** Wind generation, meteorology of wind, world distribution of wind, wind speed variation with height, wind speed statistics, Wind energy conversion principles; General introduction; Types and classification of WECS; Power, torque and speed characteristics.

UNIT-II(9hrs)

2. Wind Energy Conversion System: Aerodynamic design principles; Aerodynamic theories; Axial momentum, blade element; Rotor characteristics; Maximum power coefficient.

UNIT-III(9hrs)

3. Wind Energy Application: Wind pumps: Performance analysis, design concept and testing; Principle of wind energy generation; Wind energy in India; Environmental Impacts of Wind farms.

UNIT-IV(9hrs)

4. Small Hydropower Systems: Overview of micro, mini and small hydro systems; Hydrology; Elements of pumps and turbine; Selection and design criteria of pumps and turbines; Site selection; Speed and voltage regulation.

UNIT-V(9hrs)

5. Ocean Thermal, Tidal and Wave Energy Systems:Ocean Thermal - Introduction, Technology process, Working principle, Electricity generation methods from OCET, Advantages and disadvantages, Applications of OTEC.

6. Tidal Energy - Introduction, Origin and nature of tidal energy, Wave Energy – Introduction, Basics of wave motion, Power in waves, Wave energy conversion devices, Advantages and disadvantages, Applications of wave energy.

Reference Books:

1. Dan Charis, Mick Sagrillo, LanWoofenden, “Power from the Wind”, New Society Pub., 2009.
2. Erich Hau, “Wind Turbines-Fundaments, Technologies, Applications, Economics”, 2ndEdition, Springer Verlag, BerlinHeidelberg, NY, 2006.
3. Joshue Earnest, Tore Wizelius, Wind Power and Project Developmen”, PHI Pub., 2011.
4. T. Burton, D. Sharpe, N. Jenkins, E. Bossanyi, Wind Energy Handbook, John Wiley Pub., 2001.
5. Paul Gipe, “Wind Energy Basics”, Chelsea Green Publications, 1999.
6. Khan, B.H., “Non-Conventional Energy Resources”, TMH, 2nd Edition, New Delhi, 2009.
7. Tiwari, G.N., and Ghosal, M.K, Renewable Energy Resources – Basic Principles and applications, Narosa Publishing House,2007.

Adikavi Nannaya University :: Rajamahendravaram

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII (C2) Wind , Hydro and Ocean Energies

Model Paper

Section-A **5X5= 25M**

Answer any FIVE of the following.

1. Write a short note on wind generations.

2. Write the Aerodynamic design principles.

3. Explain maximum power coefficient.

4. Discuss wind energy in India.

5. Write about site selection of pumps and turbines.

6. Explain the elements of pumps and turbines.

7. Write any six applications of OTEC. OTEC

8. Write the applications of wave energy.

Section-B **5X10= 50M**

Answer ALL questions

9. (a) Write the general introduction, types and classification of WECS

(or)

(b) Explain the nature of variation of wind speed with height from the ground.

10. (a) Explain axial momentum theory to analyse the aerodynamics of wind turbines.

(or)

(b) Discuss about rotor characteristics of a wind turbine.

11.(a) Write the principle of wind energy generation also briefly discussion about it .

(or)

(b) Explain Environmental impacts of wind farms

12.(a) Explain overview of micro, mini and small hydro systems

(or)

(b) Explain speed and voltage regulation.

13.(a) Briefly discuss Electricity generation methods from “OCET”

(or)

(b) Explain wave energy conversion devices and also write its advantages & disadvantages

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII C2 - Wind, Hydro and Ocean Energies

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. **Introduction &** Wind Measurements	2	1	25
2. Wind Energy Conversion System & Design of Wind Turbine	2	1+1problem/Short Answer	30
3. Wind Energy Application	2	1	25
4. Small Hydropower Systems	2	1+1problem/Short Answer	30
5. Ocean Thermal, Tidal and Wave Energy Systems &Tidal Energy	2	1+1problem/Short Answer	30
Total			140

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Practical Paper-VIII C2 - Wind, Hydro and Ocean Energies

Credits : 02
2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Estimation of wind speed using anemometer.
2. Determination of characteristics of a wind generator
3. Study the effect of number and size of blades of a wind turbine on electric power output.
4. Performance evaluation of vertical and horizontal axes wind turbine rotors.
5. Study the effect of density of water on the output power of hydroelectric generator.
6. Study the effect of wave amplitude and frequency on the wave energy generated.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII C3 - Energy storage devices

No. of Credits : 03

3 Hour/Week
Total Hours: 45

UNIT-I (9 hr)

1. Energy Storage: Need of energy storage; Different modes of energy storage, Flywheel storage, Electrical and magnetic energy storage: Capacitors,electromagnets; Chemical Energy storage: Thermo-chemical, photo-chemical, electro-chemical, Hydrogen for energy storage.

UNIT-II (9 hrs)

2. Electrochemical Energy Storage Systems: Batteries: Primary, Secondary, Lithium, Solid-state and molten solvent batteries; Leadacid batteries; Nickel Cadmium Batteries; Advanced Batteries. Role of carbon nano-tubes inelectrodes.

UNIT-III (9 hrs)

3. Magnetic and Electric Energy Storage Systems: Superconducting Magnet Energy Storage(SMES) systems; Capacitor and battery: Comparison and application; Super capacitor.

UNIT-IV (9 hrs)

4. Fuel Cell: Fuel cell definition, difference between batteries and fuel cells, fuel cell components, principle and working of fuel cell, performance characteristics, efficiency, Advantages and disadvantages of fuel cell.

UNIT-V (9 hrs)

5. Types of Fuel Cells: Classification, Alkaline fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell; solid oxide fuel cell, proton exchange membrane fuel cell, applications of fuel cells.

REFERENCE BOOKS

1. J. Jensen and B. Squrensen, Fundamentals of Energy Storage, John Wiley, NY, 1984.
2. M. Barak, Electrochemical Power Sources: Primary and Secondary Batteries by, P. Peregrinus,IEE,1980.
3. P.D.Dunn, Renewable Energies, Peter Peregrinus Ltd, London, 1986.
4. B.Viswanathan and M. A. Scibioh, Fuel Cells-Principles and Applications, University Press, 2006.
5. Hart, A.B and G.J.Womack, Fuel Cells: Theory and Application, Prentice Hall, NewYork, 1989.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII C3 - Energy storage devices

Model Paper

Section-A **5X5 = 25M**

Answer any FIVE of the following.

1. Discuss various modes of energy storages.

2. Discuss need of energy storages.

3. Explain about lead acid batteries.

4. Write the applications of Batteries.

5. Definition for Fuel cell .also write difference between batteries & fuel cells.

6. Write the advantages & disadvantages of fuel cell.

7. Explain alkaline fuel cell.

8. Write applications of fuel cells.

Section –B **5X10 = 50M**

Answer All questions

9(a) Briefly discussion on electrical & magnetic energy storages

(or)

(b) Explain briefly discussion on Thermo- chemical energy storages

10.(a)Discuss Solid – state and molten solvent batteries

(or)

(b)Explain Role of carbon nano tubes in electroodes

11.(a) Briefly discussion on super conducting magnet energy storage systems (SMES)

(or)

(b) Briefly discuss about super capacitor.

12.(a) Explain principle and working of fuel cell.

(or)

(b) Write the Performance characteristics and efficiency of fuel cell.

13.(a) Discuss various types of fuel cells

(or)

(b) Explain proton exchange membrane fuel cell & also write its applications.

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Paper-VIII C3 - Energy storage devices

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Energy Storage	2	2	30
2. Electrochemical Energy Storage Systems	2	1	25
3. Magnetic and Electric Energy Storage Systems	2	1	25
4. Fuel Cell	2	1+1problem/Short Answer	30
5. Types of Fuel Cells	2	1+1problem/Short Answer	30
Total			140

Adikavi Nannaya University :: Rajamahendravarm

III B. Sc. Physics : Semester-VI

Cluster Practical Paper-VIII C3

Energy storage devices

Credits : 02
2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Study of charge and discharge characteristics of storage battery.
2. Study of charging and discharging behavior of a capacitor.
3. Determination of efficiency of DC-AC inverter and DC-DC converters
4. Study of charging characteristics of a Ni-Cd battery using solar photovoltaic panel.
5. Performance estimation of a fuel cell.
6. Study of effect of temperature on the performance of fuel cell.

OR

PROJECT