

AdiKavi Nanayya University::Rajamahendravam

Structure of Physics under CBCS

w.e.f. 2015-16 ADMITTED BATCH

<i>Year</i>	<i>Semester</i>	<i>Paper</i>	<i>Title</i>	<i>Hours</i>	<i>Marks</i>	<i>Credits</i>	
III	*Any one paper from (A), (B) and (C) can be selected	VII (A)*	Analog and Digital Electronics	3	100	03	
			Lab	2	50	02	
		VII (B)*	Material Science				
			Lab				
		VII (C)*	Renewable Energy				
			Lab				
	**Any one cluster (Set of Three Papers) from VIII-A or VIII-B or VIII-C can be selected	VI	** 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	2	50	02			
	VIII-B-2 : Practical	2	50	02			
VIII-B-3: Practical/ Project	2	50	02				

		** VIII-C	Cluster Elective-B VIII-C-1 : Solar Thermal and Photovoltaic Aspects	3	100	03
			VIII-C-2 : Wind, Hydro and Ocean Energies	3	100	03
			VIII-C-3: Energy Storage Devices.	3	100	03
			VIII-C-1 : Practical			
			VIII-C-2 : Practical	2	50	02
			VIII-C-3: Practical/ Project	2	50	02
				2	50	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.
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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 V_0 for the circuit below for $V_1=5v$ and $V_2=2v$.
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

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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

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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

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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 – Ionic-covalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – 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 of defects- Deformation- irradiation- quenching- annealing- recovery - recrystallization and grain 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 – Technological properties – Factors affecting mechanical properties of a material – Heat treatment - Cold and hot 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
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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?

பொருள் பற்றியும் பின்வரும் வினாக்கள் மூலம் விவாதிக்கப்படுகிறது.

(or)

(b) Discuss various types of dielectric material?

பொருள் பற்றியும் பின்வரும் வினாக்கள் மூலம் விவாதிக்கப்படுகிறது.

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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

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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 by G.N.Tiwari, M.K.Ghosal, Narosa Pub., 2007.
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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

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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

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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, disassembler, 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

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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 disassembler & 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 diagram of 8051 microcontroller and explain.
12. (a) Explain any 5 arithmetic 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.

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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.

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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

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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 Rhapsod 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.

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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 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 1/3rd 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 -II (9 Hours)

2. Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance 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 (R_s). Calculate the value of multiplier resistance on the 50v range of a DC voltmeter that causes a $500\mu\text{A}$ 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 impedance 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 explain 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 low and high resistance.
2. Study the limitations of a multimeter for measuring high frequency voltage and 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: Biomimetic, 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. Müller, 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?
పోలిమర్ యొక్క అణుభారమును తెలుపుము.
5. Write the applications of polyethylene?
పోలిథీన్ యొక్క అనువర్తనాలను తెలుపుము.
6. Explain about Teflon?
టెఫ్లోన్ గూర్చి వ్రాయుము.
7. Explain single electron transistors?
ఏక ఎలక్ట్రాన్ ట్రాన్సిస్టర్ను గూర్చి వ్రాయుము.
8. Discuss about stainless steels and its alloys?
స్టైయిన్ 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 ప్రాథమిక ఆధారము మరియు క్వాంటం నిర్మాణము యొక్క వృద్ధిని గూర్చి తెలుపుము.
(or)
(b) Explain one dimensional and two dimensional Nanostructures?
నానో నిర్మాణము యొక్క ఏక మరియు ద్విమితీయ నిర్మాణమును 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?
స్టెప్ పోలిమెరికరణము మరియు సమన్వయ పోలిమెరికరణమును ఒక ఉదాహరణతో వ్రాయుము.
(or)
(b) Explain Determination of molecular weight of polymers by viscometry and osmoetry?
స్థితిస్థాపత మరియు ద్రవాభిసర పద్ధతి ద్వారా పోలిమెరు 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 ఇంప్లెంట్ మరియు పోలిమైస్ ఇంప్లెంట్ పదార్థాల గూర్చి వ్రాయుము.
(or)
(b) Write about soft tissues and Hard tissues replacement implants?
మృదు కణజాలాలు, కఠిన కణజాలాలను ఏ విధముగా స్థానగమనము చెందిస్తారు.

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 Methods- ball milling, Physical Vapour deposition (PVD), Sputtering, Chemical Vapor deposition (CVD), spray 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 Nanoscience & Nanotechnology by T.Pradeep; Tata Mc. Graw Hill
3. Nanotechnology in Microelectronics & Optoelectronics, J.M Martine Duarte, 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?
ప్రోటీన్స్ యొక్క ఉపయోగాలను తెలుపుము.
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 తెలుపుము.
6. Give the electro chaemical applications?
విద్యుత్ రసాయన అనువర్తనాలను వ్రాయుము.
7. Write properties of liquid crystals?
ద్రవ స్ఫటికాల యొక్క ధర్మాలను తెలుపుము.
8. Any five application of liquid crystals?
ద్రవ స్ఫటికాల 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 కర్మణ 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 వ్యవస్థ మరియు గాజు ఏర్పడుటను వివరించుము.
12. (a) Explain various types of liquid crystals
ద్రవ స్ఫటికమునందు వివిధ రకములను తెలుపుము.
(or)
(b) Explain different liquid crystalline phase & phase transitions?
వివిధ రకాల ద్రవ స్ఫటిక ప్రావృణ మరియు పరివర్తన ప్రావృణను వివరించుము.
- 13.(a) Write about XRD, SEM, TEM, AFM and PL characterization techniques for nano materials?
నానో పదార్థముల యొక్క XRD, SEM, TEM, AFM మరియు PL లక్షణముల గూర్చి వ్రాయుము.
(or)
(b) Briefly explanation about optical properties by IR and Raman spectroscopy?
IR మరియు రామన్ వర్ణపటము యొక్క దృవణ ధర్మాలను వివరించుము.

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 nanostructures. Hall effect, termination of carrier mobility and carrier concentration; Coulomb blockade effect, thermionic emission, tunneling and hopping 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, Quantum dot, 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 ధృవణ ధర్మాలను తెలుపుము.
2. Explain columbo interaction in nanostructure?
నానో నిర్మాణమునందు ఉన్న కొలుంబ ఆకర్షణను తెలుపుము.
3. Explain coulomb blockade effect?
కొలుంబ బ్లాకేడ్ ప్రభావమును వ్రాయుము.
4. Write the application of nano particles?
నానో కణాలు యొక్క అనువర్తనాలను తెలుపుము.
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) Briefly explanation about Nano electro mechanical system(NEMS)?
నానో విద్యుత్ యాంత్రిక వ్యవస్థను తెలుపుము.
- 12.(a) Write about electric structure of Nano crystals?
నానో స్ఫటికము 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 ఔషధాలను 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 and schottky 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 desalinators and driers, 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 pyrhelimeter.
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 in electrodes.

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. Squirensen, 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, New York, 1989.

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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