MAJOR

SEMESTER-III COURSE 5: OPTICS

Theory Credits: 3 3 hrs/week

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COURSE OBJECTIVE:

The course on Optics aims to provide students with a fundamental understanding of the behaviour and properties of light and its interaction with matter.

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

1. Explain about the different aberrations in lenses and discuss the methods of minimizing them
2. Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
3. Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating and to describe the construction and working of zone plate and make the comparison of zone plate with convex lens
4. Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.
5. Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields. To understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.

UNIT-I 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 Interference

Principle of superposition – 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 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. Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer.

UNIT-III Diffraction

Introduction, distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction – Diffraction due to single slit-Fraunhoffer, Fraunhofer diffraction pattern with N slits (diffraction grating). Resolving power of grating,

Determination of wavelength of light in normal incidence 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:Polarisation

Polarized light: methods of polarization by reflection, refraction, double refraction, Brewster's law- Mauls law-Nicol prism: polarizer and analyzer, Quarter wave plate, Half wave plate-optical activity, **Fresnel's theory of optical rotation (without mathematical treatment)**, determination of specific rotation by Laurent's half shade Polarimeter. Idea of elliptical and circular polarization. **Production of circularly and elliptically polarized light.**

UNIT-V Lasers and Holography

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

REFERENCE BOOKS:

1. BSc Physics, Vol .2, Telugu Academy, 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, Ajay Ghatak, Tata Mc Graw-Hill.
6. Introduction of Lasers – Avadhanulu, S. Chand & Co.
7. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

Major [2023-24 Batch onwards]

II Year B.Sc.-Physics III Semester

Course 5: Optics

Work load: 45 hrs per semester 3 hrs/week

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BLUE PRINT FOR QUESTION PAPER SETTER

TIME : 3 hrs **Max.Marks :60**

Sl.No.	**UNIT NO. /CHAPTER NO.**		**SHORT ANSWER QUESTIONS 4 MARKS**	**ESSAY QUESTIONS 8 MARKS**	**MARKS ALLOETD TO THE UNIT**
1	I	Aberrations	1+1P	1+1	24
2	II	Interference	1+1P	1+1	24
3	III	Diffraction	1	1+1	20
4	IV	Polarization	1+1P	1+1	24
5	V	Lasers& Holography	1	1+1	20
	total		**32 marks**	**80marks**	**112 marks**

Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table. 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical).

Note:

1.The question paper setters are requested to kindly adhere to the format given in the above table.

2. The question paper setters are requested to follow revised Bloom's Taxonomy model while preparing Question paper.

3.The question paper setters are also requested to set the questions in the following way:

a. 75 % of Questions - Memory and Understanding based

b. 20 % of Questions – Application, Analysis and Skill based

c. 5 % of Questions – Creativity and Evaluation based

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MAJOR [2023-24 Batch onwards]

I Year B.Sc.-Physics III Semester

Course 5: Optics

MODEL QUESTION PAPER

Time : 3 hrs **Max marks : 60 M**

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SECTION-A

(Essay Type Questions) **Marks : 5x8M = 40 M**

Answer All questions

1A). What are aberrations in lenses? Explain the concept of Spherical aberration and it's minimization methods?

Or

b).Explain the concept of achromatic doublet. Obtain the condition for achromatism for two lenses in contact?

Two thin convex lenses of focal lengths 0.25m and 0.20m are placed coaxially 10cm apart. Find the focal length of the combination?

2a). explain the construction, experimentation of Fresnel's Biprism and deduce the equation for the wavelength of the monochromatic light?

Or

b). Describe the formation of Newton's rings in reflected light .Explain the necessary theory to determine the wavelength of the light used in the experiment?

3a). Distinguish between interference and diffraction? Describe the Fraunhofer's diffraction and the concept of intensity distribution?

Or

b). What are half period zones? Describe briefly about the construction of a zone plate?

Find the radius of the first zone in a zone plate of focal length 29cm for a light of wavelength 500nm?

4)a. what is polarization ? Explain the construction and working of a Nicol prism as polarizer and analyser?

Or

b). Explain the concept of optical activity? Describe the working of Laurent's half shade polarimeter in the determination of specific rotation?

5a). Define LASER and describe the construction and working of a Ruby laser with a neat sketch?

Or

b). What is holography and describe briefly about the working of Gabor hologram?

SECTION-B

(Short Answer Type Questions) **5x4M = 20M**

Answer any five out of the following ten questions

6). Explain briefly about the types of monochromatic aberration?

7). Obtain an expression for the achromatism for two lenses in contact ?

8). Write the conditions for sustained interference?

9). Discuss the concept of change of phase on reflection?

10). Describe about the diffraction grating and resolving power?

11). Explain the missing orders in double slit diffraction pattern?

12). State and explain law of Malus and it's significance ?

13). Calculate the thickness of a mica sheet required for making a quarter wave plate Given $\lambda = 5460$ A˚. The indices of refraction for the ordinary and extraordinary rays in mica are 1.586 and 1.592.

14). Explain the concept of population inversion?

15). What is the basic principle and applications of holography?

[Note:*Question Paper setters are instructed to add Numerical Problems with a maximum weightage of 20 marks either in Section-A or Section-B covering all the five units in the syllabus*]

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SEMESTER-III

COURSE 6: HEAT AND THERMODYNAMICS

Theory Credits: 3 3 hrs/week

COURSE OBJECTIVE:

The course on Heat and Thermodynamics aims to provide students with a fundamental understanding of the principles of heat and energy transfer and their applications in various fields

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

1. Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases
2. Gain knowledge on the basic concepts of thermodynamics, the first and the second lawof thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations. Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency
3. Develop critical understanding of concept of Thermodynamic potentials,the and understand the practical applications of substances at low temperatures.
4. Examine the nature of black body radiations and the basic theories

UNIT-I: KINETIC THEORY OF GASES:

Kinetic Theory of gases- Introduction, Maxwell's law of distribution of molecular velocities, Mean free path, Principle of equipartition of energy, Transport phenomenon in ideal gases: viscosity and Thermal conductivity.

UNIT-II: THERMODYNAMICS:

Introduction- Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature, Second law of thermodynamics Entropy: Physical significance, Change in entropy in reversible and irreversible processes; Temperature- Entropy (T-S) diagram and its uses; change of entropy when ice changes into steam.

UNIT-III: THERMODYNAMIC POTENTIALS AND MAXWELL'S EQUATIONS:

Thermodynamic Potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Joule-Kelvin coefficient for ideal and Van der Waals' gases.

UNIT-IV: LOW TEMPERATURE PHYSICS:

Methods for producing very low temperatures, Joule Kelvin effect, porous plug experiment, Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Production of low temperatures by adiabatic demagnetization

(qualitative).

UNIT-V: QUANTUM THEORY OF RADIATION: .

Spectral energy distribution of black body radiation, Wein's displacement law and Rayleigh- Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh- Jean's law from Planck's law, Solar constant and its determination using Angstrom pyro heliometer, Estimation of surface 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 and Thermodynamics -N BrijLal, P Subrahmanyam, 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

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MAJOR [2023-24 Batch onwards]

I Year B.Sc.-Physics III Semester

C6:HEAT&THERMODYNAMICS

MODEL QUESTION PAPER

Time : 3 hrs *Max marks : 60 M*

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BLUE PRINT FOR QUESTION PAPER SETTER

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

Sl.No.	**UNIT NO. /CHAPTER NO.**		**SHORT ANSWER QUESTIONS 4 MARKS**	**ESSAY QUESTIONS 8 MARKS**	**MARKS ALLOETD TO THE UNIT**
1	I		1+1	1+1	24
2	II		1+1P	1+1	24
3	III		1+1	1+1	20
4	IV		1+1	1+1	24
5	V		1+1p	1+1	20
	total		**32 marks**	**80marks**	**112 marks**

Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table. 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical).

Note:

1.The question paper setters are requested to kindly adhere to the format given in the above table.

2. The question paper setters are requested to follow revised Bloom's Taxonomy model while preparing Question paper.3.The question paper setters are also requested to set the questions in the following way:

a. 75 % of Questions - Memory and Understanding based

b. 20 % of Questions – Application, Analysis and Skill based

c. 5 % of Questions – Creativity and Evaluation based

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

Major [2023-24 Batch onwards]

II Year B.Sc.-Physics III Semester

C6:HEAT&THERMODYNAMICS

MODEL QUESTION PAPER

Time : 3 hrs ***Max marks*** *: 60 M*

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SECTION-A

Answer All Questions (5Qx8M=40M)

1.(a) Derive an expression for **coefficient of Viscosity** on the basis of kinetic theory of Gases?

(or)

(b)Explain about Maxwell's Law of distribution of molecular speeds?

2. (a) State and prove Carnot's theorem?

(or)

(b) Using temperature - entropy diagram obtain efficiency of heat engine?

3. (a) Explain about four Thermodynamic potentials and their importance?

(or)

b] Define specific heat? And prove $C_p / C_v = \gamma$

4. (a) What is Joul-Thomson effect? Obtain an expression for cooling produced when a gas suffers Joul – Thomson effect? 2+6

(or)

(b) What is Adiabatic demagnetization? And explain how low temperatures are obtained using this process?

5. (a) Write the assumptions of Plank's law?and derive Planck's law of black body radiation? 3+5

(or)

(b) Explain construction and working of Angstrom pyroheliometer?

SECTION- B

Answer any Five questions (5Qx4M=20M)

6. Explain transport phenomena?

7.How much energy must be supplied to transfer 500J of heat from a cold reservoir at -73°C to a hot reservoir at 27 °C by means of refrigerator?

8. Explain Clausius – Clapeyron's equation?

9. Write short note on second law of thermodynamics?

10.Write the Applications of low temperature Physics?

11. A thermosbottle containing coffee is vigorously shaken. Considering **coffee as a system**: then

i] does its temperature rise? ii] has heat been added to it? iii] Has work been done on it? And iv] Has its internal energy changed?

12. Calculate the temperature of the sun from the following data**:** S=1.34kw/m^2, radius of the sun = $7.92x10^5$ km, distance of the sun from the earth = $1.5x10^5$km and Stefan's constant = $5.7x\ 10^{-8}\ wm^2k^{-4}$

13.Write short note on equipartition energy?

14.Explain Reversible and Irrversible processes with examples?

15.Write the significances of thermodynamic potentials?

SEMESTER-III

COURSE 7: ELECTRONIC DEVICES AND CIRCUITS

Theory Credits: 3 3 hrs/week

COURSE OBJECTIVE:

The course on Electronic Devices and Circuits aims to provide students with a fundamental understanding of electronic devices and their applications in various circuits.

LEARNING OUTCOMES:

1. Understand the behavior of P-N junction diodes in forward and reverse bias conditions and analyze the impact of junction capacitance on diode characteristics.
2. Analyze and compare the characteristics and operation of different BJT configurations (CB, CE, and CC) and demonstrate proficiency in biasing techniques.
3. Comprehend the operation and characteristics of FETs, including JFETs and MOSFETs, and explain the working principles and characteristics of UJTs.
4. Describe the operation and applications of various photoelectric devices such as LEDs, photo diodes, phototransistors, and LDRs.
5. Understand the operation of rectifiers (half-wave, full-wave, and bridge), analyze the ripple factor and efficiency, and demonstrate knowledge of different filter types and three-terminal voltage regulators

UNIT I: PN JUNCTION DIODES

P-N junction Diode, Formation of depletion region, Forward and Reverse bias Ideal Diode, Diode equation – Reverse saturation current – Tunnel Diode- Construction, working, V-I characteristics and Applications, Zenor diode – V I characteristics, Applications

UNIT –II: BIPOLAR JUNCTION TRANSISTOR AND ITS BIASING: (D.C)

Transistor construction, working of PNP and NPN Transistors, Active, Cutoff and Saturation conditions, Configurations of Transistor - CB, CE, and CC, Input and Output Characteristics of CB and CE configurations. Hybrid parameters of a Transistor and equivalent circuit, BJT Transistor Biasing – Need for stabilization, Thermal runaway, Stability factor, Biasing methods - Voltage-Divider Bias.

UNIT-III: FIELD EFFECT TRANSISTORS & POWER ELECTRONIC DEVICES –

Difference between JFET and BJT, Construction and working of JFET, Drain and Transfer

Characteristics, MOSFET - Depletion-type, and Enhancement-Type MOSFETs. FET Biasing: Voltage Divider Biasing. UJT- Construction, working, V-I characteristics. SCR – Construction, Working and Characteristics

UNIT IV: PHOTO ELECTRIC DEVICES:

Light-Emitting Diodes (LEDs) - Construction, working, characteristics and Applications, IR Emitters, Photo diode - Construction, working characteristics and Applications, Phototransistors - Construction, working and characteristics, Applications, Structure and operation of LDR, Applications

UNIT-V: POWER SUPPLIES:

Rectifiers: Half wave, Full wave and bridge rectifiers - Efficiency (with derivations), ripple factor- Zener diode as Voltage Regulator, Filters- choke input (inductor), L-section, π-section filters. Three terminal fixed voltage IC-regulators (78XX and 79XX)

REFERENCE BOOKS:

1. Electronic Devices and Circuit Theory --- Robert L. Boylestad & Louis Nashelsky.
2. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition
3. Integrated Electronics – Millmam & Halkias.
4. Electronic Devices & Circuits – Bogart.
5. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MAJOR [2023-24 Batch onwards]

SEMESTER-III

COURSE 7: ELECTRONIC DEVICES AND CIRCUITS

MODEL QUESTION PAPER

Time : 3 hrs ***Max marks : 60 M***

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- **BLUE PRINT FOR QUESTION PAPER SETTER**

TIME : 3 hrs **Max.Marks :60**

Sl.No.	UNIT NO. /CHAPTER NO.		SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOETD TO THE UNIT
1	I		1+1	1+1	24
2	II		1+1P	1+1	24
3	III		1+1	1+1	20
4	IV		1+1	1+1	24
5	V		1+1	1+1	20
	total		**40 marks**	**80marks**	**120 marks**

Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table. 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical).

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b. 20 % of Questions – Application, Analysis and Skill based

c. 5 % of Questions – Creativity and Evaluation based

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MAJOR [2023-24 Batch onwards]

SEMESTER-III

COURSE 7: ELECTRONIC DEVICES AND CIRCUITS

MODEL QUESTION PAPER

Time : 3 hrs ***Max marks : 60 M***

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SECTION-A

ANSWER THE FOLLOWING **5X8=40**

1.write neat circuit diagram explain forward and reverse characteristics of p-n diode

or

What is zenor diode with a neat circuit diagram explain the reverse characteristics of zenor diode

2. write a neat circuit diagram explain input and output charactersticsof a CE configuration

Or

What is operating point? Who it is stabilized in a voltage divider bias method?

3. Explain FET charecteristics with a neat diagram.

Or

Exain construction and working of enhanced MOSFET

4. Discuss construction and workings of light emitting diode

Or

Discuss about construction and working of photo transistor

5. Explain construction and working of a full wave rectifier obtain it efficiency

Or

Define and obtain ripple factor explain working of L type and π type filter

SECTION-B

Write any five of the following **5X4=20**

6. Explain forward and reverse bias of a p-n junction.

7.If α in CB is 0.99, find β in CE and ϒ in CC configuratiion?.

8.Distinguish between ce,cb,cc configuration.

9.Draw an equivalent circuit of CE configuration using h-parameters.

10.Distinguish between FET and BJT.

11.Using two transistors,write equivalent model of SCR and explain its switching action?

12.Explain working of photo diode.

13.Write neat circuit diagram of bridge rectifier.

14.Explain how zenor diode act as a voltage regulator?

15.Write applications of LDR?

SEMESTER-III

COURSE 8: ANALOG AND DIGITAL ELECTRONICS

Theory Credits: 3 3 hrs/week

COURSE OBJECTIVE:

The course on Analog and Digital Electronics aims to provide students with a fundamental understanding of the principles of electronic circuits and their applications in both analog and digital systems.

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

1. Understand Principles and Working of Operational Amplifier
2. Apply their knowledge on OP-Amp in different Applications
3. To understand the number systems, Binary codes and Complements.
4. To understand the Boolean algebra and simplification of Boolean expressions.
5. To analyze logic processes and implement logical operations using combinational logic circuits.
6. To understand the concepts of sequential circuits and to analyze sequential systems in terms of state machines

UNIT-I: OPERATIAL AMPLIFIERS

Concept of feedback in CE amplifier, negative and positive feedback, advantages and disadvantages of negative feedback, Basic concepts of differential amplifier, Block diagram of op amp and its equivalent circuit, IC Diagram (IC 741), Ideal voltage transfer curve, Open loop Op-Amp configurations- differential, inverting and non-inverting Op-Amps.

Voltage Series Feedback Amplifier (Non-Inverting Op amp): Gain and Bandwidth derivations: Voltage Shunt Feedback Amplifier (Inverting Op amp): Gain and Bandwidth derivations

UNIT-II: PRACTICAL OPERATIONAL AMPLIFIER AND APPLICATIONS

Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Input offset voltage, Input bias current, Input offset current, total output offset voltage, CMRR, slew rate and concept of virtual ground.

Applications of Op-Amp: Linear Applications: Voltage Follower, Summing Amplifier, Subtracting Amplifier, Averaging Amplifier, Difference Amplifier, Integrator and Differentiator, Square Wave response of Integrator and Differentiator (Brief explanatio`n only)

UNIT-III: NUMBER SYSTEMS, CODES AND LOGIC GATES

Number Systems and Codes: Decimal, Binary, Octal and Hexadecimal number systems, conversions, Binary addition, Binary subtraction using 1's and 2's complement methods, BCD code and Gray code –Conversions Logic Gates: Construction and truth tables of OR, AND, NOT gates, Universal gates – Basic construction and truth tables of NOR & NAND, Realization of logic gates using NAND and NOR, XOR and XNOR Logic gates symbol and their truth tables. De Morgan's Laws, Boolean Laws, Simplification of Boolean Expressions using Boolean Laws.

UNIT-IV: ARITHMETIC CIRCUITS & DATA PROCESSING CIRCUITS

Half Adder and Full Adder: Explanation of truth tables and Circuits. Half Subtractor and Full Subtractor: Explanation of truth tables and Circuits, 4 - bit binary Adder/Subtractor.

Multiplexers - 2 to 1 Multiplexer, 4 to 1 multiplexer, De-multiplexers: 1 to 2 Demultiplexer, 1 to 4 Demultiplexer, Applications of Multiplexers and Demultiplexers Decoders: 1 of 2 decoders, 2 of 4 decoders, Encoders: 4 to 2 Encoder, 8 to 3 Encoder, Applications of decoders and encoders

UNIT-V: SEQUENTIAL LOGIC CIRCUITS & CODE CONVERTERS

Combinational Logic vs Sequential Logic Circuits, Sequential Logic circuits: Flip-flops, Basic NAND, NOR Latches, Clocked SR Flip-flop, JK Flip-flop, D Flip-flop, Master-Slave Flip- flop, Conversion of Flip flops.

Code Converters: BCD to Decimal Converter, BCD to Gray Code Converter, BCD to 7 segment Decoders

Reference Books:

1. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall
2. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011,
3. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., TMH
4. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
5. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
6. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

Course 8: Analog & Digital Electronics

MODEL QUESTION PAPER

Time : 3 hrs *Max marks : 60 M*

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- **BLUE PRINT FOR QUESTION PAPER SETTER**

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

Sl.No.	UNIT NO. /CHAPTER NO.		SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOETD TO THE UNIT
1	I		1+1	1+1	24
2	II		1+1P	1+1	24
3	III		1+1P	1+1	20
4	IV		1+1P	1+1	24
5	V		1+1	1+1	20
	total		**40 marks**	**80marks**	**120 marks**

Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table. 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical).

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b. 20 % of Questions – Application, Analysis and Skill based

c. 5 % of Questions – Creativity and Evaluation based

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MAJOR[2023-24 Batch onwards]

II Year B.Sc.-Physics III Semester

Course 8: Analog & Digital Electronics

MODEL QUESTION PAPER

Time : 3 hrs *Max marks : 60 M*

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SECTION - A

Answer the following questions **5x8=40M**

1a. Explain the concept of feedback and types of feedback. Derive the equation for gain and write its applications?

OR

b. Draw the circuit of OP - Amp and Explain about the characteristics of ideal Op-Amp?

2a. Discuss a concept of virtual ground and the application of an Op-amp as an voltage follower?

OR

b. Explain about the working of integrator and a differentiator ?

3a. Construct and explain the truth tables of OR, AND, NOT and EX-OR Logic gates?

OR

b.State and explain the Demorgan theorems with relevant truth tables?

4a. Explain the working of full subtractor ?

OR

b.Construct and explain the working of 8:1 Multiplexer?

5a. Describe the working of SR Flip-flop?

OR

b. Explain BCD to Gray Code Converter?

SECTION - B

Answer any FIVE of the following questions. 4x5=20M

6 . Obtain the expression for gain of an inverting of Op-Amp?

7.Given that the gain of a non- inverting Op-Amp is 2.4.The feedback back resistance is 2.4 kilo-ohms.Find the input resistance?

8. Explain briefly about the slew rate and CMRR?

9.Convert the following numbers into Hexadecimal system
a. 2048(10). b. 2315(10).

10. Explain the working of full adder with truth table?

11. Discuss the application of NAND gate as universal gate?

12. Describe the working of 1:8 De-MUX?

13. Write any four differences between combinational logic and sequential logic circuits ?

14.Mention any two advantages and disadvantages of negative feed back?

15.Write a short note on BCD to Decimal converter?

MINOR

SSEMESTER-III COURSE 5: OPTICS

Theory Credits: 3 3 hrs/week

****

COURSE OBJECTIVE:

The course on Optics aims to provide students with a fundamental understanding of the behaviour and properties of light and its interaction with matter.

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

6. Explain about the different aberrations in lenses and discuss the methods of minimizing them
7. Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
8. Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating and to describe the construction and working of zone plate and make the comparison of zone plate with convex lens
9. Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.
10. Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields. To understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.

UNIT-I 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 Interference

Principle of superposition – 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 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. Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer.

UNIT-III Diffraction

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

Polarized light: methods of polarization by reflection, refraction, double refraction, Brewster's law-Mauls law-Nicol prism: polarizer and analyzer, Quarter wave plate, Half wave plate-optical activity, **Fresnel's theory of optical rotation (without mathematical treatment)**, determination of specific rotation by Laurent's half shade Polarimeter. Idea of elliptical and circular polarization. **Production of circularly and elliptically polarized light.**

UNIT-V Lasers and Holography

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

REFERENCE BOOKS:

8. BSc Physics, Vol .2, Telugu Academy, Hyderabad
9. A Text Book of Optics-N Subramanyam, L Brijlal, S. Chand& Co.
10. Unified Physics Vol. II Optics & Thermodynamics – Jai Prakash Nath & Co. Ltd., Meerut
11. Optics, F.A. Jenkins and H.G. White, Mc Graw-Hill
12. Optics, Ajay Ghatak, Tata Mc Graw-Hill.
13. Introduction of Lasers – Avadhanulu, S. Chand & Co.
14. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MINOR [2023-24 Batch onwards]

II Year B.Sc.-Physics III Semester

Course 5: Optics

Work load: 45 hrs per semester 3 hrs/week

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- **BLUE PRINT FOR QUESTION PAPER SETTER**

TIME : 3 hrs **Max.Marks :60**

Sl.No.	UNIT NO. /CHAPTER NO.		SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOETD TO THE UNIT
1	I	Aberrations	1+1P	1+1	24
2	II	Interference	1+1P	1+1	24
3	III	Diffraction	1	1+1	20
4	IV	Polarization	1+1P	1+1	24
5	V	Lasers& Holography	1	1+1	20
	total		**32 marks**	**80marks**	**112 marks**

Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table. 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical).

Note:

1.The question paper setters are requested to kindly adhere to the format given in the above table.

2. The question paper setters are requested to follow revised Bloom's Taxonomy model while preparing Question paper.

3.The question paper setters are also requested to set the questions in the following way:

a. 75 % of Questions - Memory and Understanding based

b. 20 % of Questions – Application, Analysis and Skill based

c. 5 % of Questions – Creativity and Evaluation based

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

MINOR [2023-24 Batch onwards]

I Year B.Sc.-Physics III Semester

Course 5: Optics

MODEL QUESTION PAPER

Time : 3 hrs **Max marks : 60 M**

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SECTION-A

(Essay Type Questions) **Marks : 5x8M = 40 M**

Answer All questions

1A). What are aberrations in lenses? Explain the concept of Spherical aberration and it's minimization methods?

Or

b).Explain the concept of achromatic doublet. Obtain the condition for achromatism for two lenses in contact?

Two thin convex lenses of focal lengths 0.25m and 0.20m are placed coaxially 10cm apart. Find the focal length of the combination?

2a). explain the construction, experimentation of Fresnel's Biprism and deduce the equation for the wavelength of the monochromatic light?

Or

b). Describe the formation of Newton's rings in reflected light .Explain the necessary theory to determine the wavelength of the light used in the experiment?

3a). Distinguish between interference and diffraction? Describe the Fraunhofer's diffraction and the concept of intensity distribution?

Or

b). What are half period zones? Describe briefly about the construction of a zone plate?

Find the radius of the first zone in a zone plate of focal length 29cm for a light of wavelength 500nm?

4)a. what is polarization ? Explain the construction and working of a Nicol prism as polarizer and analyser?

Or

b). Explain the concept of optical activity? Describe the working of Laurent's half shade polarimeter in the

determination of specific rotation?

5a). Define LASER and describe the construction and working of a Ruby laser with a neat sketch?

Or

b). What is holography and describe briefly about the working of Gabor hologram?

SECTION-B

(Short Answer Type Questions) 5x4M = 20M

Answer any five out of the following ten questions

6). Explain briefly about the types of monochromatic aberration?

7). Obtain an expression for the achromatism for two lenses in contact ?

8). Write the conditions for sustained interference?

9). Discuss the concept of change of phase on reflection?

10). Describe about the diffraction grating and resolving power?

11). Explain the missing orders in double slit diffraction pattern?

12). State and explain law of Malus and it's significance ?

13). Calculate the thickness of a mica sheet required for making a quarter wave plate Given $\lambda = 5460\ A^{\circ}$. The indices of refraction for the ordinary and extraordinary rays in mica are 1.586 and 1.592.

14). Explain the concept of population inversion?

15). What is the basic principle and applications of holography?

[Note:*Question Paper setters are instructed to add Numerical Problems with a maximum weightage of 20 marks either in Section-A or Section-B covering all the five units in the syllabus*]

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V TH SEMESTER

Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Selected

Four-year B.Sc. (Hons)
Domain Subject: **Physics**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100+50

Course 7B: Solar Energy and Applications
[Skill Enhancement Course (Elective), Credits: 05]

I. Learning Outcomes: After successful completion of the course, the student will be able to:

1. Understand Sun structure, forms of energy coming from the Sun and its measurement.
2. Acquire a critical knowledge on the working of thermal and photovoltaic collectors.
3. Demonstrate skills related to callus culture through hands on experience
4. Understand testing procedures and fault analysis of thermal collectors and PV modules.
5. Comprehend applications of thermal collectors and PV modules.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

Unit - I: BASIC CONCEPTS OF SOLAR ENERGY (10hrs)

Spectral distribution of solar radiation, Solar constant , zenith angle and Air-Mass, standard time, local apparent time, equation of time, direct, diffuse and total radiations. Pyrheliometer - working principle, direct radiation measurement, Pyrometer-working Principle, diffuse radiation measurement, Distinction between the two meters.

Unit - II: SOLAR THERMAL COLLECTORS (10hrs)

Solar Thermal Collectors-Introduction, Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency, Evacuated tube collector, collector overall heat loss coefficient, Definitions of collector efficiency factor, collector heat-removal factor and collector flow factor, Testing of flat-plate collector, solar water heating system, natural and forced circulation types.
Concentrating collectors, Solar cookers, Solar dryers, Solar desalinators.

Unit - III: FUNDAMENTALS OF SOLAR CELLS (10hrs)

Semiconductor interface, Types, homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photovoltaic cell, equivalent circuit, output parameters, conversion efficiency, quantum efficiency, Measurement of I-V characteristics, series and shunt resistance, their effect on efficiency, Effect of light intensity, inclination and temperature on efficiency

Unit -IV: TYPES OF SOLARCELLS AND MODULES (10 hrs)

Types of solar cells, Crystalline silicon solar cells, I-V characteristics, poly-Si cells, Amorphous silicon cells, Thin film solar cells-CdTe/CdS and CuInGaSe2/CdS cell configurations, structures, advantages and limitations, Multi junction cells – Double and triple junction cells. Module fabrication steps, Modules in series and parallel, Bypass and blocking diodes

Unit – V: SOLAR PHOTOVOLTAIC SYSTEMS (10hrs)

Energy storage in PV systems, Energy storage modes, electrochemical storage, Batteries, Primary and secondary, Solid-state battery, Molten solvent battery, lead acid battery and dry batteries, Mechanical storage – Flywheel, Electrical storage –Super capacitor

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B.Sc. PHYSICS SYLLABUS UNDER CBCS

III Year B.Sc.-Physics V Semester

Course 7B: Solar Energy and Applications
MODEL QUESTION PAPER

Time : 3 hrs **Max marks : 60 M**

BLUE PRINT FOR QUESTION PAPER SETTER

TIME : 3 hrs **Max.Marks :60**

Sl.No.	UNIT NO. /CHAPTER NO.		SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
1	UNIT I	BASIC CONCEPTS OF SOLAR ENERGY	2	2	24
2	UNIT II	SOLAR THERMAL COLLECTORS	2	2	24
3	UNIT III	FUNDAMENTALS OF SOLAR CELLS	1	2	20
4	UNIT IV	TYPES OF SOLARCELLS AND MODULES	2	2	24
5	UNIT V	SOLAR PHOTOVOLTAIC SYSTEMS	1	2	20
	Total no. of Questions		8X4=32	10X8=80	112
	Total Marks including Choice				

- Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table.
- 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical) for a total of 20 marks.

Note:

1.The question paper setters are requested to kindly adhere to the format given in the above table.

2. The question paper setters are requested to follow revised Bloom's Taxonomy model while preparing Question paper.

3.The question paper setters are also requested to set the questions in the following way:

a. 75 % of Questions - Memory and Understanding based

b. 20 % of Questions – Application, Analysis and Skill based

c. 5 % of Questions – Creativity and Evaluation based

Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

III Year B.Sc.-Physics V Semester

Course 7B: Solar Energy and Applications

MODEL QUESTION PAPER

Time : 3 hrs **Max marks : 60 M**

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SECTION-A

(Essay Type Questions) *Marks* : 5x8M = 40M

Answer All questions with internal choice from each Unit

1. A] Explain the following: I] Solar constant , ii]zenith angle and iii] Air-Mass, & iv] standard time, local apparent time 2+2+2+4

OR

B.] Explain the construction and working of Pyrheliometer?

2.A] Explain the construction and working of liquid heating type Flat plate collector ?and Also write advantages and disadvantages ? 6+4

OR

B] Explain natural and forced circulation types solar water heating system? 5+5

3.A] What is solar cell? And explain briefly about photovoltaic effect? 3+7

OR

B] Explain the following:I]Solar cell I-V characteristics and ii]shunt resistance 6+4

4. A]What is thin film solar cells? And explain about CdTe/CdS thin film solar cell? 3+7

OR

B.] Explain the Bypass diode and Blocking diode? 5+5

5. A] Explain the types of solar pv systems?

OR

B] Explain the construction and working of Lead Acid battery?

SECTION-B

(Short Answer Type Questions)

Marks : 5x4M = 20M

Answer any five out of the following ten questions

6. Draw and explain about Sun structure?
7. Define and explain about direct, diffuse and total radiations?
8. Explain construction and working of Solar desalinator?
9. Write Short note on Evacuated tube Collectors?
10. Explain the following:I] Homojunction and ii] Heterojunction
11. Discuss the steps involved to fabricate PV Module?

12. What are poly-Si cells
13. Write short note on energy storage modes?

GDC(W) AUTONOMOUS

Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Selected

Four-year B.Sc. (Hons)
Domain Subject: **PHYSICS**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100+50

Course 6B: LOW TEMPERATURE PHYSICS & REFRIGERATION
(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes: Students after successful completion of the course will be able to

1. Identify various methods and techniques used to produce low temperatures in the Laboratory.
2. Acquire a critical knowledge on refrigeration and air conditioning.
3. Demonstrate skills of Refrigerators through hands on experience and learns about refrigeration components and their accessories.
4. Understand the classification, properties of refrigerants and their effects on environment.
5. Comprehend the applications of Low Temperature Physics and refrigeration.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

UNIT-I PRODUCTION OF LOW TEMPERATURE (10 hrs)

Production of low temperatures-Introduction, Freezing mixtures, Joule-Thomson effect. Regenerative cooling, Different methods of liquefaction of gases, liquefaction of air, Production of liquid hydrogen and nitrogen, Adiabatic demagnetization, Properties of materials at low temperatures, Superconductivity

UNIT-II MEASUREMENT OF LOW TEMPERATURE (10 hrs)

Gas thermometer and its correction and calibration, Secondary thermometers, resistance thermometers, thermocouples, Vapour pressure thermometers, Magnetic thermometers, Advantages and drawbacks of each type of thermometer.

UNIT-III PRINCIPLES OF REFRIGERATION (10 hrs)

Introduction to Refrigeration- Natural and artificial refrigeration , Stages of refrigeration, Types of refrigeration - Vapor compression and vapor absorption refrigeration systems, Refrigeration cycle and explanation with a block diagram, Introductory ideas on air-conditioning.

Refrigerants-Introduction, Ideal refrigerant, Properties of refrigerant, Classification of refrigerants, commonly used refrigerants, Eco-friendly refrigerants

UNIT-IV COMPONENTS OF REFIGERATOR (10 hrs)

Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER), Refrigerator components: Types of compressors, evaporators and condensers and their functional aspects, defrosting in a refrigerator, Refrigerant leakage and detection

UNIT-V APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION (10 hrs.)

Applications of Low temperatures: Preservation of biological material, Food freezing, liquid nitrogen and liquid hydrogen in medical field, Superconducting magnets in MRI- Tissue ablation (cryosurgery) - Cryogenic rocket propulsion system.

Applications of refrigeration: Domestic refrigerators, Water coolers, Cold storages, Ice plants, Food preservation methods, Chemical and Process industries, Cold treatment of metals, Construction field, Desalination of water, Data centers

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B.Sc. PHYSICS SYLLABUS UNDER CBCS

III Year B.Sc.-Physics V Semester

Course 6B: LOW TEMPERATURE PHYSICS&REFRIGERATION
MODEL QUESTION PAPER

****

BLUE PRINT FOR QUESTION PAPER SETTER

TIME : 3 hrs **Max.Marks :60**

Sl.No.	UNIT NO. /CHAPTER NO.		SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
1	UNIT I		2	2	24
2	UNIT II		1	2	24
3	UNIT III		2	2	20
4	UNIT IV		1	2	24
5	UNIT V		2	2	20
	Total no. of Questions		8X4=32	10X8=80	112
	Total Marks including Choice				

- Note: 1.The question paper setters are requested to kindly adhere to the format given in the above table. 2.The question paper setters are also requested to set the questions based on problems (conceptual or numerical) for a total of 20 marks.

Note:

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Government Degree College for Women(A), Srikakulam.

B.Sc. PHYSICS SYLLABUS UNDER CBCS

III Year B.Sc.-Physics V Semester

Course 6B: LOW TEMPERATURE PHYSICS&REFRIGERATION
MODEL QUESTION PAPER

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SECTION A

Answer ALL Questions 5x8=40M

1a. Define and explain Joule-Kelvin effect to acquire low temperatures?

OR

b. Explain the necessary theory in the production of liquid Nitrogen by Claude's method?

2a.Discuss the construction of Gas thermometer with a neat sketch and write its advantazes?

OR

b. Explain about the construction and working of Vapour pressure thermometer?

3a. Explain the principle and working of Vapour compression machine and air conditioner?

OR

b. Discuss the role of refrigerant in a refrigerator? Write its properties and classify them?

4a.What are the main components of refrigerator and explain them?

OR

b. Discuss the various methods of detection of refrigerant leakage in a refrigerator?

5a. Describe the construction and working of water coolers?

OR

b. Explain the process of desalination of water and food storage methods?

SECTION B

Answer ANY FIVE Questions 5x8=40M

6. State the working principle of Adiabatic Demagnetization and mention its applications?

7. Define Meissner effect and write its properties?

8. Describe the working of resistance thermometer?

9. Expand and explain

i.CFC ii.HCFC iii. HFC iv. HFO

10.Mention the methods of defrosting the refrigerator?

11.Explain i.COP ii.EER

12.Mention the application of cryogenic liquids in medical industry?

13.Define THE FOLLOWING

i. Quenching ii. Blanching iii. Tissue abblation