(SA)

Code No. 0508 / CORE

FACULTY OF SCIENCE

M. Sc. III – Semester Examination, December 2019

Subject : Physics

Paper – I : Modern Optics

Time : 3 Hours **Max. Marks: 80**

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 Describe the main components in laser devices.
2 Discuss different pumping mechanisms in Lasers.
3 Explain the working of Dye laser. Mention its applications.
4 What are the applications of Excimer laser?
5 What is spatial frequency filtering? Explain.
6 Write a short note on Fourier transform hologram.
7 Discuss the phase transformation properties of a thin-lens.
8 Explain the self focusing of light in a non-linear medium.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 (a) Derive the rate equations for three level and four level lasers systems.

OR

(b) What is an active medium? Describe the absorption and emission processes in an active medium and derive Einstein's relations.

10 (a) Describe the construction and working of Nd: YAG laser.

OR

(b) Describe the principle, construction and working of CO_2 laser. Mention some of its industrial applications.

11 (a) Distinguish between in-line and off-axis holograms. Give the detailed theory of off-axis holography.

OR

(b) Describe in detail about volume hologram with necessary theory.

12 (a) Describe how optical mixing is achieved and explain parametric generation of light.

OR

(b) Describe the Fourier transforming property of a thin-lens when the object is placed in front of the lens.

*****

Code No. 0510 / CORE

FACULTY OF SCIENCE

M. Sc. III – Semester Examination, December 2019

Subject : Physics

Paper – II : Advanced Solid State Physics

Time : 3 Hours **Max. Marks: 80**

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 Write a note on Brillouin zones.
2 State and explain DeHass – Von Alphan effect.
3 Discuss in detail concept of local field.
4 Explain in detail ferroelectric hysteresis .
5 Discuss in detail Weiss theory of spontaneous magnetization.
6 Explain in detail on ferrites and applications.
7 What is Meissner effect?
8 Discuss in detail Josephson effect.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 (a) Explain in detail Fermi surfaces in simple cubic, bcc and FCC lattice.

OR

(b) Discuss in detail effect of electric and magnetic fields on Fermi surfaces.

10 (a) Discuss in detail about ionic, electronic and orientational polarization and derive the expression for Clausius – Mosottic relation.

OR

(b) What is dipole relaxation and discuss the theory of ferroelectrics?

11 (a) Explain detail Langevin's and quantum theory of diamagnetism.

OR

(b) Write a note on (i) Heisenberg exchange interaction (ii) Neel's theory of anti-ferromagnetism and (iii) Ferromagnetic domains.

12 (a) Discuss in detail (i) Effect of magnetic field on super conductivity, (ii) type I and type II super conductors and (iii) Isotope effect.

OR

(b) Explain in detail BCS theory of superconductivity and applications of superconductivity.

*****

12218509001.

Code No. 0526 / CORE

FACULTY OF SCIENCE

M. Sc. III – Semester Examination, December 2019

Subject : Physics
(Specialization : Electronics Instrumentation)

Paper – III : Electronics Instrumentation

Time : 3 Hours **Max. Marks: 80**

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 What are different types of errors? Explain with examples.
2 Obtain the response of first order system to a step input.
3 Write the characteristic of isolation amplifier.
4 Draw and explain S/H circuit.
5 Explain frequency divider generator.
6 Discuss Audio frequency wave analyzer briefly.
7 Explain the working of power factor meter.
8 Explain the principle of seven segment display systems.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 (a) Obtain the transfer function of second order instrumentation system and discuss the response of STEP input.

OR

(b) Obtain the transfer function of first order instrumentation system and discuss the response of ramp input.

10 (a) Draw the circuit diagrams of logarithmic and anti-logarithmic amplifiers. Obtain expressions for their output and explain.

OR

(b) Draw the circuit diagram of frequency to voltage converter and explain its function.

11 (a) Describe the function generator with a neat diagram and explain each block.

OR

(b) What are wave analyzer? Explain the operation of harmonic distortion analyzer.

12 (a) Write a note on the following:
(i) Q-meter and (ii) Digital voltmeter

OR

(b) Explain the working of LCD system. Mention their applications.

*****

Code No. 0529 / CORE / A

FACULTY OF SCIENCE

M. Sc. III – Semester Examination, December 2019

Subject : Physics
(Specialization : Electronics Instrumentation)

Paper – IV (A) : Digital Logic Circuits

Time : 3 Hours **Max. Marks: 80**

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

1 Simplify the expression AB′C′+A′B′C′+A′BC′ + A′B′C and draw the required logic circuit using basic gates.
2 Designs a 4-bit parallel binary adder.
3 Explain the construction of NAND and NOR gate latches.
4 Write a note on 74193 counter.
5 What are the TTL series characteristics?
6 Write a note on code converters.
7 Write a note on static RAM.
8 Explain the logic for programming of PLD.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

9 (a) Explain the Karnaugh map method for simplifying the four variable sum of products by various processes.

OR

(b) Explain in detail about the singed numbers, binary subtraction and BCD addition with examples.

10 (a) Explain the construction and working of J-K flip-flop with timing diagram and comment on toggling.

OR

(b) Discuss the construction and operation of 4-bits synchronous counter and mention its limitations.

11 (a) Explain the construction, operation and characteristics of emitter – coupled logic (ECL).

OR

(b) Discuss the construction and working of multiplexers and mention their applications.

12 (a) Explain the architecture and discuss various types of ROMs.

OR

(b) Describe the architecture of VHDL and explain the method of representing data in VHDL.

*****