

FACULTY OF SCIENCE

M. Sc. III – Semester (CBCS/Non-CBCS) Examination, December 2016

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) Explain the optical pumping mechanism used in Lasers.
- 2) Explain the necessary conditions for emission of laser light.
- 3) Draw the energy level diagram of He-Ne laser.
- 4) Give the classification of lasers based on active material.
- 5) Distinguish between holography and photography.
- 6) What is a Gabor hologram?
- 7) Explain second harmonic generation.
- 8) What is self focusing of light?

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

- 9 (a) Obtain the threshold condition for lasing. Explain the characteristics of laser light.
OR
(b) What is a resonant cavity? Explain various modes of laser light in a rectangular cavity.
- 10 (a) Explain the working of a Nd : YAG laser. What are its applications?
OR
(b) Explain the working of semiconductor laser and describe its applications.
- 11 (a) Explain the recording and reconstruction processes of off-axis holograms.
OR
(b) Explain the application of hologram for vibration analysis and spatial filtering.
- 12 (a) Explain the Fourier transforming property of thin lens when object is placed behind the lens.
OR
(b) Explain the phase matching and optical mixing.

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M. Sc. III – Semester Examination, December 2016

Subject : Physics

Paper – II (A) : 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 What is de-Hass-Van Alphen effect?
- 2 What do you mean by Fermi surface?
- 3 Write a short note on Ferroelectric hysteresis and indicate remanent polarization and coercive field in the hysteresis loop.
- 4 Briefly comment on dipole relaxation.
- 5 What are ferromagnetic domains?
- 6 What do you mean by Bloch wall?
- 7 Give some applications of superconductors.
- 8 What is (i) Isotope effect and (ii) Persistent current in super conductivity.

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

- 9 (a) Discuss various types of "zone schemes".
OR
(b) Describe Fermi surfaces in simple cubic, bcc and fcc lattices.
- 10 (a) Discuss Ferro electricity in BaTiO₃ and KDP.
OR
(b) What are various types of polarization in dielectrics? Derive expressions for electronic and ionic polarizabilities.
- 11 (a) Distinguish ferro, anti-ferro and ferri magnetic materials. Give Neel's theory of antiferromagnetism.
OR
(b) What are ferrites? Give their structure and applications.
- 12 (a) Distinguish between Type-I and Type-II super conductors. Discuss the BCS theory of low temperature super conductivity.
OR
(b) Explain the following:
 - (i) Super conducting energy gap
 - (ii) Coherence length
 - (iii) Penetration depth

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M. Sc. III – Semester (CBCS/Non-CBCS) Examination, December 2016

**Subject : Physics
(Specialization : Electronic Instrumentation)**

Paper – III : 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 Elucidate minimizing sum of products.
- 2 Explain binary subtraction rules with suitable examples.
- 3 Write the working of D Flip flop and D-Latch.
- 4 Write the significance of IEEE/ANSI symbols in digital electronics.
- 5 Discuss about digital IC terminology.
- 6 Design a BCD 7 segment decoder/drive to drive a common anode 7 segment LED display.
- 7 Discuss the basic function of a 32x4 memory.
- 8 Draw the VHDL entity and architecture for wrapper concept and hierarchical use.

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

- 9 (a) Describe K-map for three and four variables, and also explain the don't care conditions.
OR
(b) Discuss about the methods to simplify the subtraction operation.
- 10 (a) Describe the working of RS and JK Flip flops.
OR
(b) Design a up / down counter using 74193 and explain its logical working.
- 11 (a) What is an encoder? Explain in detail with examples.
OR
(b) Describe the working of CMOS transistor gate. How to interface C-MOS & TTL?
- 12 (a) Describe the PLD architecture and its applications.
OR
(b) Discuss about semi-conductor ROMS and their architecture.

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M. Sc. III – Semester Examination, December 2016

**Subject : Physics
(Specialization : Electronic Instrumentation)**

Paper – IV : Microprocessors, DSPs and Interfacing

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 Discuss the addressing modes in 8086 microprocessor.
- 2 What are Mnemonics? Describe about MUL, IMUL, DIV, IDIV instructions.
- 3 Discuss about the interrupt priority schemes used in 8259.
- 4 What are the basic modes of operation of 8255?
- 5 Discuss the central architecture logic unit of TMS320C5X.
- 6 Explain the memory mapped registers of TMS329C5X.
- 7 Explain load and store Instructions.
- 8 Discuss the TDM serial port in TMS320C5X.

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

- 9 (a) With relevant pin diagrams explain the minimum and maximum mode operations of 8086.
OR
(b) Write an ALP in 8086 to generate a symmetrical square wave form with 1KHz frequency? Give the necessary circuit setup with a DAC.
- 10 (a) Distinguish between Mode set control word and BSR control Word of 8255.
OR
(b) Discuss about the interrupt priority schemes used in 8259.
- 11 (a) Explain in detail on-chip memory of TMS320C5X.
OR
(b) Explain the function of parallel logic unit and memory mapped register of TMS320C5X.
- 12 (a) Write in detail about serial Port (RS-232).
OR
(b) Write features of VESA and AGP buses.

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M. Sc. III – Semester (CBCS/Non-CBCS) Examination, December 2016

**Subject : Physics
(Specialization : Electronic Instrumentation)**

Paper – V : Electronic 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 Explain the linearity of errors with examples.
- 3 Write the characteristic of isolation amplifiers.
- 4 Explain the voltage frequency converters. What are its applications?
- 5 Explain in brief on the working of RF generator.
- 6 Write a note on audio frequency wave analyzer.
- 7 Explain the working of digital frequency meter.
- 8 With diagram explain the working of power factor meter.

**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) Arrive the transfer function of second order instrumentation system and discuss the response of IMPULSE input.
- 10 (a) With neat circuit diagram explain the construction and working of Butterworth and Chebychev filters.
OR
(b) Draw the circuit diagram for phase sensitive detector explain its construction, working and applications.
- 11 (a) What is harmonic distortion analyzer? With circuit diagrams explain the working and applications of AM and FM wave analyzers.
OR
(b) Draw the block diagram of function generator and explain each block.
- 12 (a) With a neat circuit diagram explain the working of Laser printer.
OR
(b) Explain the construction and working of Liquid crystal display system. What are its applications?