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Code No. 16513/CORE

FACULTY OF SCIENCE

M. Sc. III – Semester Examination, March / April 2021

Subject : Physics
Paper – I : Modern Optics

Time : 2 Hours **Max. Marks: 80**

PART – A

Answer any five questions. **(5 x 7 = 35 Marks)**

1 Describe any four properties of a laser beam
2 Mention the various pumping mechanisms in lasers with examples
3 Draw the energy level diagram of a carbondioxide molecule and show the laser transitions in a carbon dioxide laser.
4 Differentiate between temporal coherence and spatial coherence
5 Write a note on Fourier transform hologram
6 Write an expression for the Fresnel Diffraction integral and explain each parameter
7 Explain how a lens performs a fourier transform on an incident light beam
8 What is meant by spatial frequency filtering? Explain one application

PART – B

Answer any three questions. **(3 x 15 = 45 Marks)**

9 Explain the processes that occur when monochromatic light interacts with a two level atomic system. Deduce Einstein coefficients.

10 Obtain an expression for population inversion in a three level laser system.

11 Explain the construction and working of a Ruby laser, its characteristics and applications.

12 With an energy level diagram, explain how an excimer laser is produced. Give examples and applications of excimer lasers.

13 What is a Hologram? Explain in detail, the steps of recording and reconstruction of the object in holography.

14 Explain how an Off-axis hologram removes the disadvantages of a Gabor hologram.

15 Deduce the thickness function for a thin converging lens under paraxial approximation

16 (a) Explain various types of lenses and What are the fourier transforming properties of lenses.
(b) Explain Phase Matching.

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Code No. 16514 / CORE

FACULTY OF SCIENCE

M.Sc. III-Semester (CBCS) Examination, March 2021

Sub: Physics

Paper – II : Advanced Solid State Physics

Time: 2 Hours | Max.Marks:80

PART – A

Answer any five questions. (5x7=35 Marks)

1 Distinguish between Fermi surface and Brillouin zone.
2 Define extended, periodic and reduced zone schemes diagrammatically.
3 Explain terms: (i) dielectric polarization (ii) dipole relaxation
4 List the properties of ferroelectric materials.
5 Distinguish between ferromagnetism and anti-ferromagnetism.
6 List the application of ferrites.
7 Explain Meissner effect.
8 Differentiate between type-I and type-II superconductors.

PART – B

Answer any three questions. (3x15=45 Marks)

9 Explain de Hass-Van Alphen effect. Why this method is considered to be a powerful to study Fermi surfaces?

10 Explain how Harrison's method is used to construct Fermi surfaces, using extend zone method.

11 Explain electronic, ionic and orientation polarisability. Explain the ferroelectric hysteresis nature in detail.

12 Obtain Clauses-Mosotti relation and discuss the concept of local field.

13 Give an account of Weiss theory of ferromagnetism and describe paramagnetic cooling method.

14 Explain Bloch wall and discuss Neel's theory of anti-ferromagnetism in detail.

15 Discus London's phenomenological approach made in superconductors. Obtain a relation for London penetration depth.

16 Explain BCS theory and write the applications of superconductors.

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Code No. 16525 / CORE

FACULTY OF SCIENCE

M.Sc. III-Semester (CBCS) Examination, March/April 2021

Subject: Physics
(Specialization: Electronic Instrumentation)
Paper – III : Electronic Instrumentation

Time: 2 Hours **Max.Marks:80**

PART – A

Answer any five questions. **(5x7=35 Marks)**

1 Distinguish between zero, first and second order systems.
2 Discuss briefly about various types of errors.
3 Draw and explain S/H circuit.
4 Explain the voltage to frequency converters.
5 Explain briefly the working of noise generator.
6 Write a note on audio frequency wave analyzer.
7 Describe the working principle of XY-recorder.
8 Explain the characteristics of LED.

PART – B

Answer any three questions. **(3x15=45 Marks)**

9 (a) Obtain an expression for the transfer function of first order instrumentation system.
(b) Discuss the response of a first order system to a step input.

10 Explain in detail the response of a second order system to an impulse input.

11 Explain the construction and working of an isolation amplifier. Mention its merits and demerits.

12 Draw the circuit diagram of log and anti-logarithmic amplifier. Obtain an expression for their outputs.

13 Describe the construction of a function generator.

14 What is harmonic distortion? Define total harmonic distortion.

15 Draw the block diagram of vector voltmeter and discuss its working.

16 With a neat diagram explain the working of Laser printer.

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Code No. 16526/A/ CORE

FACULTY OF SCIENCE

M.Sc. III-Semester (CBCS) Examination, July 2021

Subject: Physics
(Specialization: Electronic Instrumentation)
Paper – IV : Digital Logic Circuits

Time: 2 Hours **Max.Marks:80**

PART – A

Answer any five questions. **(5x7=35 Marks)**

1 Explain Don't care condition with a combinational logic circuits.
2 Explain the designing of combinational logic circuits.
3 Describe the clock signals in Flip-flops.
4 Draw the diagram of NAND latch with truth table.
5 Explain the TTL loading and fan-out characteristics.
6 List the applications of the Multiplexers.
7 Explain general memory operation.
8 Write some applications of programmable Logic Devices.

PART – B

Answer any three questions. **(3x15=45 Marks)**

9 Describe how Karanaugh Map simplification method is used in the circuit analysis.

10 Explain BCD addition and Hexadecimal arithmetic with examples.

11 Describe clocked R-S Flip-flop and clocked J-K Flip-flop with diagrams and truth tables.

12 Explain in detail the UP/DOWN counters and pre-settable counters.

13 What is Decoder? Describe BCD to 7 segment decoder.

14 Explain CMOS logic and writes its characteristics.

15 Describe the architecture of the PROM in Programmable Logic Devices.

16 How ROMs are classified? Write the applications of the ROM.

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