RAH-003-001402   Seat No. _____

B. Sc. (Sem. IV) (CBCS) Examination

March / April – 2019

Physics : Paper - 401

(Optics, Laser & Electronics)

(Old Course)

Faculty Code : 003

Subject Code : 001402

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1)   All questions are compulsory.

(2)   Symbols have their usual meaning.

(3)   Figures right side indicate marks.

1   Answer all the following questions : (each one mark)   **20**

(1)   Write formula for the radius of nth half period zone.

(2)   Write formula for the dispersive power of the prism.

(3)   The rate of spontaneous transition R_{sp} = _____.

(4)   Ruby laser is a _____ laser.

(5)   Give the name of excited states with longer life time.

(6)   Multimode fibers are classified into _____ types.

(7)   What is the equation of numerical aperture ?

(8)   Write formula for the fraction Refractive index.

(9)   How many types of basic transistor LC oscillators ?

(10)   The condition $kA_v \geq 1$ is known as _____ criterion.

(11)   The modulated radio-wave travels with the velocity _____ m/s.

(12)   Microphone is device which converts sound waves into _____ waves.

(13)   In AM-Modulation, Amplitude of _____ waves changed ?

(14)   A modulated wave can be demodulated by _____ circuit.

(15) JFET has _____ terminals semiconductor device.

(16) Junction Field effect transistor (FET) is _____ control device.

(17) NOR-Gate is combination of _____ gates.

(18) Give the name of the universal gates.

(19) In photo-transistor, write the equation of collector current ?

(20) Solar Cell converts the solar energy into _____.

2 (a) Define the following : (answer any **three**) 6
    (1) Plane diffraction Grating.
    (2) Spontaneous emission.
    (3) Pumping Process.
    (4) Numerical Aperture (NA)
    (5) Term : Feedback
    (6) LC-Oscillators

  (b) Explain the following : (answer any **three**) 9
    (1) Comparison between a zone plate and convex lens.
    (2) Three level pumping scheme.
    (3) Medical applications of fiber optics.
    (4) Advantages of fiber optics.
    (5) Principle and construction of Phase-shift oscillator.
    (6) Principle and working of Colpitt oscillator.

  (c) Write answer any two : 10
    (1) Explain the theory of zone plate.
    (2) Derive the equations of Einstein relationships.
    (3) Explain the construction and working of Ruby laser.
    (4) Derive an expression for acceptance angle of the optical fiber.
    (5) Explain the construction, working of Hartley Oscillator.

3 (a) Define the following : (answer any **three**)   **6**
- (1) Modulation and its types.
- (2) Amplitude modulation (AM).
- (3) Advantages of JFET.
- (4) Analog and Digital signal.
- (5) OR-gate
- (6) Light Dependent Resistance.

(b) Explain the following : (answer any **three**)   **9**
- (1) Essentials in demodulation.
- (2) A.M. diode Detector.
- (3) Give the symbol an construction of MOSFET.
- (4) NOT-gate with necessary figure and truth table.
- (5) NAND and NOR gate.
- (6) Photo transistor.
- (7) Construction and working Solar cell.

(c) Write answer any **two** :   **10**
- (1) Explain the transistor AM-modulator.
- (2) Describe the construction and working of a UJT.
- (3) Discuss, Encoders and Decoders in detail.
- (4) Explain the Superhetrodyne Radio receiver.
- (5) Describe in detail, the Liquid crystal display (LCD).

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