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Reg. No. : .....

Name : .....

**First Semester M.Sc. Degree Examination, September 2022**

**Physics with Specialization in Nano Science/Physics with Specialization  
in Space Physics**

**PH NS 513 / PH SP 513 – BASIC ELECTRONICS**

**(2020 Admission Onwards)**

Duration : 3 Hours

Max. Marks : 75

**PART – A**

Answer any **five** questions. **Each** question carries **3** marks.

1. What is the miller effect in circuits?
2. Discuss any two principal functions are performed by a shift register.
3. How high quantum efficiency is achieved in LED structures?
4. Briefly discuss the significance of parity in digital systems.
5. What are tunnel diodes? What is the use of tunnel diodes in digital circuits?
6. Explain how a BCD decade counter can be used as a divide by -10 device.
7. What is the difference between a basic comparator and the Schmitt trigger?
8. Why are strain gauges used in bridge arrangement?

**(5 × 3 = 15 Marks)**

P.T.O.



## PART – B

Answer any **three** questions. Each question carries **15** marks.

9. (a) Discuss the pin configuration of IC 555  
(b) Describe the monostable operation of IC 555 with output wave forms.

OR

10. (a) Describe the working of a voltage-controlled oscillator.  
(b) Explain how triangular wave generator can be converted to sawtooth generator.
11. (a) Explain the working of a four input multiplexer with the help of necessary diagrams.  
(b) Discuss the working of a BCD to decimal decoder.

OR

12. (a) Briefly explain the working of a J-K flip flop? How does master-slave flip flop overcome a race around a problem?  
(b) How J-K flip flops can be converted to T and D type flip flops?
13. (a) With necessary diagrams explain the working of a CRO.  
(b) How is the vertical axis of an oscilloscope deflected? How does it differ from the horizontal axis?

OR

14. (a) What are laser diodes? Describe the principle of operation of a laser diode.  
(b) Discuss the laser diode modes and threshold conditions.

**(3 × 15 = 45 Marks)**

## PART – C

Answer any **three** questions. Each question carries **5** marks.

15. In a Schmitt trigger circuit,  $R_1 = 150\ \Omega$ ,  $R_2 = 68\ \Omega$ ,  $V_{in} = 500\ mV$  pp sine wave and the saturation voltages =  $\pm 14\ V$ . Determine the threshold voltages  $V_{ut}$  and  $V_{lt}$ . Also find the value of hysteresis voltage  $V_{hy}$ .
16. In a triangular wave generator  $V_{sat} = \pm 14\ V$ ,  $R_2 = 1.2\ k\Omega$ ,  $R_3 = 6.8\ k\Omega$ ,  $R_1 = 120\ k\Omega$  and  $C_1 = 0.01\ \mu F$ . Determine the peak-to-peak output amplitude and frequency of the triangular wave.
17. Multiply the signed binary numbers using repeated addition  
  
Multiplicand : 011110110    multiplier : 100000100
18. A step index fiber has a core diameter of  $100\ \mu m$  and a refractive index of 1.480. The cladding has a refractive index of 1.460. Calculate the numerical aperture of the fiber, acceptance angle from air and the number of modes sustained when the source wavelength is 850 nm.
19. Show how two 7482 adders can be connected to form a four-bit adder.
20. A platinum resistance thermometer has a resistance of  $100\ \Omega$  at  $25^\circ C$ . Find its resistance at  $50^\circ C$ . The resistance temperature coefficient of platinum is  $0.00392\ \Omega/\Omega^\circ C$ . If the thermometer has a resistance of  $200\ \Omega$  calculate the value of temperature.

**(3 × 5 = 15 Marks)**

