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S – 5715

Reg. No. : .....

Name : .....

First Semester M.Sc. Degree Examination, October 2023

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

PHNS 513/PHSP 513 : BASIC ELECTRONICS

(2020 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

PART – A

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

1. What is Miller effect? Why it is important?
2. Explain the operation of a tunnel diode.
3. What is a phase locked loop?
4. What if CMRR of an Op-amp? How is CMRR measured?
5. Describe how the slew rate of an op-amp can be improved.
6. What if meant by a single-mode fibre? How it is realised?
7. Draw the circuit diagrams for any two LED drivers.
8. Show how a multiplexer may be used as a parallel to serial converter?

(5 × 3 = 15 Marks)

P.T.O.

PART – B

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

9. What are Bode plots? Discuss Bode plots of voltage gain and phase angle of an amplifier.

OR

10. Discuss the theory and operation of comparators and Schmitt trigger using op-amp.

11. What if meant by programmable array logic? Explain the working of a PLA and explain how it is programmed?

OR

12. Explain the working principle of *J-K*, *T* and *D* FLIP-FLOPS.

13. Discuss the working, structure, the rate equations and quantum efficiency of laser diode.

OR

14. What are transducers? Discuss the working principle of any three transducers and how are they used in sensing circuits.

(3 × 15 = 45 Marks)

PART – C

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

15. Derive the relationship between rise-time and *RC* in an amplifier.

16. Determine the order of a low-pass Butter Worth filter that provides 40 dB attenuation at $\frac{\omega}{\omega_0} = 2$

17. How can a shift register be used to multiply or divide a binary number by 2?

18. How is an SR FLIP-FLOP is converted into a T FLIP-FLOP, and D FLIP-FLOP into T type.

19. A step index multimode fiber with a numerical aperture of 0.26 and a core refractive index of 1.5 and core diameter of 100 micro-meter. Calculate the refractive index of cladding and maximum number of modes wit a wavelength of 1 micrometer that the fiber can carry.

20. How a thermistor is used for electronically measuring temperature? Explain using a circuit diagram.

(3 × 5 = 15 Marks)
