

Reg. No. : .....

Name : .....

**First Semester M.Sc. Degree Examination, February 2025**

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

**PH 213/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. Discuss on the frequency response of an amplifier circuit.
2. What is 7441 BCD to a seven-segment decoder?
3. Differentiate thermocouples and thermistors.
4. What are universal shift registers and find out their applications?
5. Examine monostable and astable multivibrator circuits using IC 555.
6. Write a note on optical amplifiers and their basic applications.
7. Obtain an expression for phase angle.
8. What is the magnitude comparator in digital electronics?

**(5 × 3 = 15 Marks)**

P.T.O.



## PART – B

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

9. (a) Draw the circuit of a square wave generator using an op-amp.  
(b) Derive the expression for the period of a symmetrical waveform.

OR

10. (a) Examine different types of diodes with examples.  
(b) Analyse the frequency response of BJT and FET.
11. (a) Explain registers with their types.  
(b) Differentiate various flip flops in digital circuits.

OR

12. (a) Write down the possibility of arithmetic circuits using HDL.  
(b) Differentiate between asynchronous and synchronous electronic counters.
13. (a) What are transducers? Find out its classifications.  
(b) Write a note on optical fibers.

OR

14. (a) How optical fiber acts as a waveguide? Write down the mode theory of circular waveguide.  
(b) Obtain the quantum efficiency and power of an LED.

**(3 × 15 = 45 Marks)**

## PART – C

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

15. Use the pinout diagram for a 54/7427 triple 3-input NOR gate and show how to connect a simple RS flip-flop.
16. Determine the operating point for a silicon transistor biased by the base bias method with  $\beta = 100$ ,  $R_B = 500K\Omega$ ,  $R_C = 2.5K\Omega$ , and  $V_{CC} = 20V$ . Also, draw the DC load line.



17. The datasheet of a JFET gives the following information:  $I_{DSS} = 3 \text{ mA}$ ,  $V_{GS}(\text{off}) = -6\text{V}$  and  $g_m(\text{max}) = 5000 \mu\text{S}$ . Determine the transconductance for  $V_{GS} = -4\text{V}$  and find the drain current  $I_D$ .
18. With a neat circuit diagram and waveforms explain the working of a full wave bridge rectifier and show that its ripple factor is 0.48.
19. A bulb of power 40 W is used for 12.5 hrs each day for 30 days. Calculate the electrical energy consumed.
20. A JFET has the following parameters:  $I_{DSS} = 32 \text{ mA}$ ;  $V_{GS}(\text{off}) = -8\text{V}$ ;  $V_{GS} = -4.5 \text{ V}$ . Find the value of drain current.

**(3 × 5 = 15 Marks)**

