Reg. No. : ....

Name : ....

First Semester M.Sc. Degree Examination, May 2022

Physics

PH 213 — BASIC ELECTRONICS

(2020 Admission onwards)

Time : 3 Hours

Max. Marks : 75

PART – A

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

1. Derive the relation between the power gain, current and voltage gain of an amplifier.

2. What are the basic building blocks of an op-amp?

3. Draw the equivalent circuit diagram of an ideal op-amp.

4. What is meant by programmable logic array?

5. Briefly explain the operation of a decade counter.

6. What are the main differences between LED and laser diode?

7. How flow is measured?

8. Differentiate between active and passive transducers.

(5 × 3 = 15 Marks)

PART – B

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

9. What are active filters? Briefly explain the working principles and design of low pass and high pass (first and second order) Butterworth filters.

OR

10. Discuss the theory and operation of sine wave, square wave and triangular wave generators using op-amps.

11. How are binary adder, subtractor, multiplier and divider constructed? Explain.

OR

12. Explain the working principle of various counters.

13. Give a brief account of the theory of modes in optical fibers.

OR

14. Discuss with block diagram the working principle of a CRO. Explain in detail the horizontal and vertical deflection systems.

(3 × 15 = 45 Marks)

PART – C

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

15. Consider an ac amplifier with midband voltage gain of 200. If the cutoff frequencies are 20Hz and 20KHz, what does the frequency response look like? What are the voltage gain if the input frequency is 5Hz and 200 KHz?

16. Design a second order bandpass filter with a midband voltage gain of 50(34dB), a centre frequency of 160 Hz, and a 3dB bandwidth B=16 Hz.

17. Give the connection diagram of a BCD to decimal decoder and discuss its operation.

18. Verify that the J-K FLIP-FLOP truth table is satisfied by the difference equation $Q_{n+1} = J_n \overline{Q}_n + \overline{K}_n Q_n$.

19. Calculate the total number of guided modes propagating in the step-index fiber having a diameter of core equal to 60 micro-meters and numerical aperture of 0.25, operating at a wavelength of 2.7 micro-meter?

20. An LED emitting at a peak wavelength of 1310 nm has radiative and non radiative recombination time of 30 and 100 ns respectively. Calculate the internal quantum efficiency and internal power level, given the drive current equals to 40 mA.

(3 × 5 = 15 Marks)

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