

**PG CBCS**  
**M.Sc. Semester- III Examination, 2022**  
**PHYSICS**

PAPER: PHS 303B

(APPLIED ANALOG ELECTRONICS-I & APPLIED DIGITAL ELECTRONICS-I)

**Full Marks: 40**

**Time: 2 Hours**



**Write the answer for each unit in separate sheet**

**UNIT- PHS 303B.1**

**APPLIED ANALOG ELECTRONICS-I**

**GROUP-A**

**1. Answer any TWO from the following questions:**

**2×2=4**

- a) What is totem pole configuration?
- b) How to quickly identify whether a log amplifier is working properly or not?
- c) What is an active filter? Draw the ideal response of the band pass and band stop filter.
- d) What will be the typical input voltage range of an anti-log or exponential amplifier and why?

**GROUP-B**

**2. Answer any TWO from the following questions:**

**2×4=8**

- a) Derive the output voltage expression of a BJT differential pair
- b) Explain four quadrants analog multiplier using a details circuit diagram and its working principle.
- c) What is a zero-crossing detector? Explain its operation using a clear diagram.
- d) Design an active low pass filter and find the cut-off frequency expression of the same?

**GROUP-C**

**3. Answer any ONE from the following questions:**

**1×8=8**

- a) Derive output voltage expression of a typical instrumentation amplifier. What is the basic difference between a typical differential amplifier and an instrumentation amplifier? Write a few applications of an instrumentation amplifier.
- b) What is the transfer function of an active filter? Draw typical characteristics of a Chebyshev and Butterworth active filter. Derive the cutoff frequency of a fourth-order type-I Chebyshev filter.

(1)

(P.T.O.)



**UNIT- PHS 303B.2**  
**APPLIED DIGITAL ELECTRONICS-I**

**GROUP-A**

1. Answer any **TWO** of the following questions:

**2×2=4**

- a) Why Emitter Coupled Logic (ECL) is the fastest among all other logic family members?
- b) What is the difference between TDMA and FDMA?
- c) Draw a CMOS inverter circuit.
- d) What is ARPANET?

**GROUP-B**

2. Answer any **TWO** of the following questions:

**2×4=8**

- a) Explain the operation of 2- inputs NAND gate using CMOS circuit?
- b) Explain how ISDN works? Differentiate SRAM and DRAM.
- c) What are the ratioed and ratioless logic? Draw and explain in brief voltage transfer characteristics (VTC) for both cases. (1+3)
- d) A certain memory has a capacity of  $32 \times 16$ . How many bits are there in each word? How many words are being stored and how many memory cells does this memory contain? (1+3)

**GROUP-C**

3. Answer any **ONE** of the following questions:

**1×8=8**

- a) Explain the operation of the 6T SRAM cell and 1T1C DRAM cell in detail? Explain the operation of 2- inputs NAND gate using totem pole circuit. What do you mean by Schottky TTL? Why is it faster than standard TTL?
- b) Explain the operation of 2- inputs NAND gate using totem pole circuit. What do you mean by Schottky TTL? Why is it faster than standard TTL?

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