

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fourth Semester B.Tech (Minor) Degree Examination June 2024 (2022 Admission)

**Course Code: MRT282****Course Name: FUNDAMENTALS OF ANALOG AND DIGITAL ELECTRONICS**

Max. Marks: 100

Duration: 3 Hours

**PART A***(Answer all questions; each question carries 3 marks)*

Marks

- |    |                                                                                                                 |   |
|----|-----------------------------------------------------------------------------------------------------------------|---|
| 1  | List two differences between BJT and FET and mention one usage of both.                                         | 3 |
| 2  | What is the condition to be satisfied to obtain sustained oscillations? Mention one application of oscillators. | 3 |
| 3  | Explain the importance of isolation amplifier.                                                                  | 3 |
| 4  | What are the practical Op Amp Characteristics?                                                                  | 3 |
| 5  | Define duty cycle.                                                                                              | 3 |
| 6  | What is the significance of VCO?                                                                                | 3 |
| 7  | Reduce the function $f(A, B, C, D) = \sum m(0, 7, 8, 9, 10, 12) + d(2, 5, 13)$ using K map                      | 3 |
| 8  | Implement a half subtractor using gates.                                                                        | 3 |
| 9  | What is race around condition?                                                                                  | 3 |
| 10 | Differentiate synchronous and asynchronous counter.                                                             | 3 |

**PART B***(Answer one full question from each module, each question carries 14 marks)***Module -1**

- |    |                                                                                                                                                          |    |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 11 | a) Explain the construction, working and characteristics of a n channel enhancement mode MOSFET.                                                         | 10 |
|    | b) A single stage transistor has an open loop gain of 600 and closed loop gain of 50. Calculate the percentage of output which is fed back to the input. | 4  |
| 12 | a) Explain the working of a common emitter BJT amplifier.                                                                                                | 7  |
|    | b) Draw the circuit diagram of a Hartley Oscillator and explain how tank circuits aid in oscillations.                                                   | 7  |

**Module -2**

- |    |                                                                                                                    |   |
|----|--------------------------------------------------------------------------------------------------------------------|---|
| 13 | a) With suitable circuit diagram explain op-amp as an integrator. Draw the frequency response of ideal integrator. | 7 |
|    | b) Design an inverting amplifier with gain of -5 and input resistance of 10 kΩ.                                    | 7 |

- 14 a) With the help of a circuit diagram. explain the working of an Inverting Amplifier 7  
and derive the expression for closed loop gain.
- b) Explain a zero crossing detector using op amp. 7

**Module -3**

- 15 a) Explain the working of IC 555 free running multivibrator with necessary 10  
diagrams.
- b) Explain lock range and capture range. 4
- 16 a) Compare band pass and band stop filters. 6
- b) Explain PLL with suitable diagrams. 8

**Module -4**

- 17 a) Design and implement 3 bit gray to binary code converter. 8
- b) State and prove De-Morgan's theorem. 6
- 18 a) Implement the function  $f(A, B, C) = \sum m(0, 1, 3, 4, 7)$  using 8x1 multiplexer. 6
- b) What is a full adder? Design and implement a full adder using logic gates. 8

**Module -5**

- 19 a) Design a 3-bit synchronous up-down counter. 10
- b) How is a sequential circuit differ from a combinational circuit? Mention one 4  
example of each.
- 20 a) What is SR flip flop? 4
- b) With suitable logic and timing diagrams explain the Parallel-In-Serial-Out Shift 10  
Register.

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