

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S3 (S,FE) Examinations June 2026 (2019 Scheme)



Course Code: MRT203

Course Name: ANALOG AND DIGITAL ELECTRONICS

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

Marks

- | | | |
|----|---|-----|
| 1 | Explain the concept of feedback and its types. Mention the advantages of negative feedback. | (3) |
| 2 | Give a short note on Barkhausen criteria. | (3) |
| 3 | Write the important features of an ideal operational amplifier. | (3) |
| 4 | Explain S/H circuit using op-amp. | (3) |
| 5 | Discuss the importance of VCO. | (3) |
| 6 | Give a short note on astable multivibrator. | (3) |
| 7 | State the reason behind calling NAND and NOR gates universal gates. | (3) |
| 8 | Compare NAND, NOR and EX-OR gates with their truth tables. | (3) |
| 9 | Distinguish between synchronous and asynchronous circuits. | (3) |
| 10 | Discuss on twisted ring counter. | (3) |

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

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|----|---|------|
| 11 | a) Explain the construction, working and characteristics of depletion MOSFET. | (10) |
| | b) How tank circuits aid in oscillations? | (4) |
| 12 | a) Discuss the operation of Colpitts Oscillator with the help of a circuit diagram. | (10) |
| | b) Compare Class A with Class B amplifiers. | (4) |

Module -2

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|----|---|------|
| 13 | a) Explain the concept of negative feedback in amplifiers. Using this concept, explain voltage-series and voltage-shunt feedback topologies in detail with diagrams and equations. | (14) |
| 14 | a) What is a V-I Converter? With appropriate diagrams and mathematical analysis, explain how an op-amp can be used to convert a voltage input into a controlled current output. Include at least one real-life application. | (14) |

Module -3

- 15 a) Using a neat diagram, explain the operation of the 555 Timer in terms of comparators, flip-flop, and discharge transistor. (14)
- 16 a) With an appropriate block diagram, describe the operation of a PLL and explain any one practical application. (14)

Module -4

- 17 a) Show how an octal number is encoded into a 3-bit binary code using an encoder. Explain with diagram and truth table. (10)
- b) Draw the circuit of a Half Adder and explain how it performs addition of two bits. (4)
- 18 a) Explain how a full adder can be constructed using only NAND gates. Include step-by-step derivation, circuit diagram and timing considerations. (10)
- b) State De Morgan's Theorems and prove them using truth tables. (4)

Module -5

- 19 a) Discuss in detail about different flipflops in digital circuits. (14)
- 20 a) Design 3-bit synchronous up counter using JK Flip flops. (14)
