

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – SOFTWARE SYSTEMS (Five year Integrated)

ANALOG AND DIGITAL ELECTRONICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 1 = 10)

1. Which of the following binary number is equivalent to decimal number 125_{10} ?
(a) 1100001 (b) 1111101
(c) 1010001 (d) 1011001
2. What is the BCD representation of the decimal number 25?
(a) 0010 0101 (b) 1010 1101
(c) 1100 0101 (d) 0010 0110
3. XOR circuits can be constructed using
(a) OR gates only (b) AND, OR gates
(c) AND, NOT gates (d) AND, NOT and OR gates
4. Which of the following represents the Distributive Law?
(a) $A \cdot (B+C) = (A \cdot B) + (A \cdot C)$ (b) $A+A=A$
(c) $A \cdot 1=A$ (d) $A+B=B+A$
5. Half adder consists of _____ gates.
(a) XOR & AND (b) AND & NOT
(c) XOR & NOT (d) AND & OR
6. In a decoder circuit, which gate is typically used to produce the final outputs?
(a) OR gate (b) AND gate
(c) NOR gate (d) NOT gate
7. Which flip-flop is also known as a "latch" when it lacks a clock input?
(a) SR flip-flop (b) D flip-flop
(c) JK Flip-Flop (d) T flip-flop
8. A 4-bit synchronous counter is also known as a:
(a) Mod-4 counter (b) Mod-8 counter
(c) Mod-10 counter (d) Mod-16 counter
9. The output of an op-amp differentiator circuit is proportional to
(a) input voltage (b) rate of change of the input voltage
(c) integral of the input voltage (d) difference of two input voltages
10. Slew rate is defined as
(a) voltage gain of the op-amp (b) maximum rate of change of i/p voltage
(c) input impedance of the op-amp (d) maximum rate of change of o/p voltage

Cont...

SECTION - B (25 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 5 = 25)

11 a Convert the binary numbers $(111011101)_2$ to octal and hexadecimal formats.

OR

b Explain in detail about types of complements.

12 a Discuss on De-morgan's Law.

OR

b Minimize the function using K-map: $F = \sum m(1, 2, 3, 5, 6, 7)$.

13 a. Compare Decoder and Encoder.

OR

b Differentiate the types of multiplexers.

14 a Distinguish between synchronous and asynchronous counter.

OR

b Elucidate on Ring counter with block diagram.

15 a Describe the concept of common-mode rejection ratio (CMRR) in op-amps.

OR

b Explain the working principle of a differential amplifier.

SECTION - C (40 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

Question No. 16 is Compulsory

16 Discuss various number systems with example.

17 a Demonstrate the basic logic gates with truth table.

OR

b Describe the basic theorems and laws of Boolean Algebra.

18 a Explain design procedure of binary adders.

OR

b Draw and explain the types of shift register.

19 a Realize D flip-flop and T flip flop using SR flip-flop.

OR

b Explain the working of J-K flip-flop & S-R flip-flop.

20 a Discuss the design and operation of an op-amp-based adder and subtractor.

OR

b Compare the applications of integrator and differentiator circuits using op-amps.

Z-Z-Z

END