

SEAT NO. : _____

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SARDAR PATEL UNIVERSITY

B.Sc. Examination Semester - 05

Subject : PHYSICS US05CPHY24

Subject title : Analog and Digital circuits

Date : 8/ 10 /2025

Time : 10:00 to 1:00

TOTAL MARKS : 70

N.B. : (i) All the symbols have their usual meanings.

(ii) Figures at the right side of questions indicate full marks.

Que : 1 Answer the following MCQ with the correct option. (10)

1. When transistor used in CE mode in amplifier, the upper 3 – dB frequency is also known as _____ frequency.

(a) β - cut off (b) input (c) α - cut off (d) middle

2. The voltage gain at low frequency for CE transistor amplifier mainly decreases because of _____.

(a) source resistance (b) bypass capacitor
(c) hybrid- π capacitance (d) none of these

3. How many active device are used in push – pull amplifier.

(a) 2 (b) 3 (c) 1 (d) none

4. How many inputs of conventional operational amplifier have ?

(a) 1 (b) 3 (c) 2 (d) 4

5. An output impedance of an ideal operational amplifier is _____.

(a) infinite (b) one (c) less than one (d) zero

6. In integrator, the feedback resistor is replaced by _____ when op-amp is used as an integrator.

(a) supply (b) capacitor (c) resistor (d) none

7. A string of four bits is called _____.

(a) base (b) nibble (c) byte (d) pair

8. An inverter is also called _____ gate.

(a) AND (b) OR (c) NOR (d) NOT

9. D- flip- flop has how many inputs ?

(a) 3 (b) 2 (c) 1 (d) 4

10. The D latch is useful to avoid _____ condition.

(a) set (b) race (c) reset (d) no change

Que : 2 Answer any TEN questions in short. (Each of two marks)

(20)

1. Define gain bandwidth product (f_T)

2. Write the function of bypass capacitor in CE amplifier.

3. Define : α - cut-off frequency and β - cut off frequency.

4. What is class AB operation and give its advantage.

5. Draw Dual input balanced output configuration for op-amp.

6. Define : CMRR and Slew rate.

7. Write characteristics of ideal operational amplifier.

8. Convert decimal number 25 in to binary number.

9. Write full form of ASCII code.

PTO.

(1)



10. Explain in short OR gate with proper circuit.
11. Explain RS Flip-flop briefly.
12. Draw circuit diagram of mod-10 counter.
- Que : 3. (a) Draw the hybrid- π model for high frequency of CE amplifier and explain its components. (6)
- (b) Explain functions of coupling and bypass capacitor in CE amplifier. (4)
- OR
- (a) Draw the circuit diagram of class – B push-pull amplifier and explain its operation. (6)
- (b) Explain cross over distortion in class – B push-pull amplifier. (4)
- Que: 4. (a) Obtain the equation of close loop voltage gain of ideal inverting and non inverting op-amp. (6)
- (b) Explain any parameters of operational amplifier. (4)
- OR
- (a) Explain operational amplifier as an differentiator with proper circuit diagram (6)
- (b) What is active filter ? Draw various active filter responses (4)
- Que:5 (a) State first and second De morgan's theorems. Explain De morgan's second theorem. (6)
- (b) What is number system ? Give atleast two example of conversion of hexa decimal number into binary numbers. (4)
- OR
- (a) Explain two input Exclusive –NOR gate and give its truth table. (6)
- (b) Discuss two input TTL NAND gate circuit and explain its truth table. (4)
- Que:6. (a) Explain edge triggered JK master –slave flip-flop with circuit diagram and give its truth table. (6)
- (b) Explain clocked D flip-flop with its truth table and diagram. (4)
- OR
- (a) With the suitable diagram discuss ring counter and give its timing diagram. (6)
- (b) Explain 4- bits synchronous counter with proper diagram. (4)

(2)

