

SEAT No. \_\_\_\_\_

No. of Printed Pages : 02

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## SARDAR PATEL UNIVERSITY

### Fifth (V<sup>th</sup>) Semester (CBCS) B. Sc. Examination

Friday, 26<sup>th</sup> November 2021

Time : 03:00 P.M. to 05:00 P.M.

Subject : PHYSICS [US05CPHY24]

**ANALOG AND DIGITAL CIRCUITS**



**Total Marks : 70**

**Note : All the symbols have their usual meaning.**

**Q.1 Write correct answer for each of the following MCQs. (Attempt All) (10)**

- In low frequency response, the voltage gain of an amplifier \_\_\_\_\_ with increase in frequency.  
(a) increases (b) decreases (c) remains constant (d) remains zero
- In transistor amplifier, high frequency response is determined by \_\_\_\_\_.  
(a) bypass capacitors (b) coupling capacitors  
(c) junction capacitors (d) transition capacitors
- How do we obtain sinusoidal output out of a class B amplifier?  
(a) By using non-sinusoidal inputs (b) By utilizing two transistors  
(c) By biasing it in the active region (d) By adding a capacitor to the output
- Operational Amplifier has \_\_\_\_\_ inputs.  
(a) single (b) similar (c) zero (d) differential
- CMRR stands for which of the following?  
(a) Central Mode Rejection Ratio (b) Cross Mode Rejection Ratio  
(c) Common Model Rejection Ratio (d) Common Mode Rejection Ratio
- The Exclusive-OR gate recognizes only words with an \_\_\_\_\_ number of 1s.  
(a) even (b) odd (c) equal (d) ordinary
- Small-scale integration (SSI) refers to ICs with fewer than \_\_\_\_\_ gates on the same chip.  
(a) 12 (b) 24 (c) 32 (d) 64
- The standard TTL NAND gate has \_\_\_\_\_ emitter input transistor.  
(a) single (b) grounded (c) multiple (d) common
- When the set is enabled in S-R flip flop then the output will be \_\_\_\_\_.  
(a) Reset (b) Set (c) no change (d) intermediate
- Ripple counters are also called \_\_\_\_\_.  
(a) SSI counters (b) Synchronous counters  
(c) Asynchronous counters (d) VLSI counters

**Q.2 Fill in the blanks and True-False. (Attempt All) (08)**

**Fill in the blanks.**

- In CE amplifier the voltage gain is \_\_\_\_\_ in mid frequency region. (zero, constant)
- CMRR of an Op-Amp should be as \_\_\_\_\_ as possible. (large, small)
- NAND gate is equivalent to bubbled \_\_\_\_\_ gate. (OR, AND)
- 5400 series TTL gates are used for \_\_\_\_\_ applications. (commercial, military)

**(P.T.O)**

**State whether True or False**

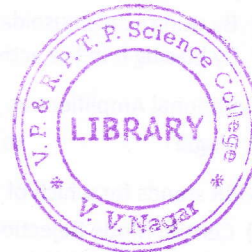
1. In transistor amplifier, low frequency response is determined by coupling capacitors.
2. The bandwidth of an ideal Op-Amp is infinite.
3. The bipolar technology uses transistors for fabrication on a chip.
4. A flip flop cannot be used as a register.

**Q.3**

**Answer briefly any ten of the following questions.**

**(20)**

1. What is the significance of emitter bypass capacitor in Common emitter amplifier?
2. Explain hybrid capacitances in high frequency model for CE amplifier.
3. Giving proper diagram describe Cross Over Distortion.
4. What are the characteristics of an ideal of Op-Amp ?
5. Explain the term Operational Amplifier.
6. Define Op-Amp parameters : Input offset current ( $I_{os}$ ) and input offset voltage ( $V_{os}$ ).
7. Convert following hexadecimal numbers to binary numbers.  
(i) BAD6 (ii) FE4C
8. Explain giving figure double inversion with two cascaded inverters. Does the connection acts like inverter or noninverter?
9. Briefly explain bipolar and MOS families of digital ICs.
10. What is race condition? Explain.
11. Explain the operation of RS flip-flop.
12. Briefly explain buffer register.



**Que.-4**

**Answer any four of the following questions in detail**

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1. Giving proper circuit diagram explain the effect of emitter bypass capacitor on low frequency response of CE amplifier. Prove that the power gain at low frequency drops 3 dB from gain at the mid frequency.
2. Draw the circuit diagram of Class B Push-Pull amplifier and explain its working.
3. Drawing AC equivalent circuit of differential amplifier and hence derive expression for gain of the amplifier in difference mode configuration.
4. Describe the application of Op-Amp, Summing Amplifier using inverting mode.
5. Giving proper logic circuit diagrams and truth tables explain basic and universal logic gates.
6. Giving proper circuit diagram explain the working of two inputs TTL NAND gate. Explain Totem-pole output.
7. With suitable logic diagram explain the working of JK Master-Slave flip-flop.
8. Explain the working of 4-bit ring counter with suitable logic circuit diagram. Discuss its applications.

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