PINE TRAINING ACADEMY

INSTRUCTIONS FOR CANDIDATE

NAME: ———————————————

PHONE NO.: ———————————————

1. There are total 35 questions.
2. There are three sections, section 1 contains 19 questions of digital and analog electronics, out of which 1-15 carry 2 marks each and 16-19 are subjective question which carry 5 marks each.
3. Section 2 contains 7 questions of programming from C and VHDL, out of which 1-5 carry 2 marks each and 6-7 are subjective questions, which carry 10 marks each.
4. Section 3 contains 10 questions of general, which carry 2 marks each.
5. Candidates can carry calculators with them.

[MAXIMUM MARKS: 100]   [TIME: 2 HOURS]

## SECTION-1: DIGITAL AND ANALOG ELECTRONICS

1. A sine wave voltage is applied across a capacitor. When the frequency of the voltage is decreased, the current

   A. Increases

   B. remains constant

   C. Decreases

   D. Ceases

2. A 4-variable AND-OR circuit produces a 0 at its Y output. Which combination of inputs is correct?

   A. A = 0, B = 0, C = 1, D = 1

   B. A = 1, B = 1, C = 0, D = 0

   C. A = 1, B = 1, C = 1, D = 1

   D. A = 1, B = 0, C = 1, D = 0

3. The following waveform pattern is for
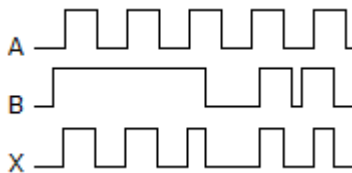
   A. 2-input AND gate

   B. 2-input OR gate

   C. Exclusive-OR gate

   D. None of the above

4. When a capacitor charges:

   A. the voltage across the plates rises exponentially

   B. the circuit current falls exponentially

   C. the capacitor charges to the source voltage in $5 \times RC$ seconds

   D. all of the above

5. A 22-k Ω resistor and a 0.02- μ F capacitor are connected in series to a 5-V source. How long will it take the capacitor to charge to 3.4 V?

   A. 0.44 ms

   B. 0.501 ms

   C. 0.66 ms

   D. 0.70 ms

6. What is the function of the comparators in the 555 timer circuit?

   A. to compare the output voltages to the internal voltage divider

   B. to compare the input voltages to the internal voltage divider

   C. to compare the output voltages to the external voltage divider

   D. to compare the input voltages to the external voltage divider

7. Determine the output frequency for a frequency division circuit that contains 12 flip-flops with an input clock frequency of 20.48 MHz.

   A. 10.24 kHz

   B. 5 kHz

   C. 30.24 kHz

   D. 15 kHz

8. On a master-slave flip-flop, when is the master enabled?

   A. when the gate is LOW

   B. when the gate is HIGH

   C. both of the above

   D. neither of the above

9. Edge-triggered flip-flops must have:

A.   very fast response times

B.   at least two inputs to handle rising and falling edges

C.   edge-detection circuits

D.   None of the above

10. A MOD-16 ripple counter is holding the count 1001_2. What will the count be after 31 clock pulses?

A. 1000_2 B. 1010_2

C. 1011_2 D. 1101_2

11. A gated S-R latch and its associated waveforms are shown below. What, if anything, is wrong and what could be causing the problem?
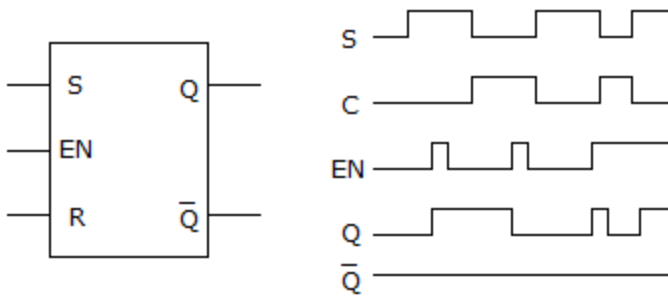
A.   The $\overline{Q}$ output is always low; the circuit is defective.

B.   The Q output should be the complement of the $\overline{Q}$ output; the S and R terminals are reversed.

C.   The Q should be following the R input; the R input is defective.

D.   There is nothing wrong with the circuit.

12. A 4-bit ripple counter consists of flip-flops, which each have a propagation delay from clock to Q output of 15 ns. For the counter to recycle from 1111 to 0000, it takes a total of _____.

A.   15 ns

B.   30 ns

C.   45 ns

D.   60 ns

13. Convert binary 111111110010 to hexadecimal.

A. $EE2_{16}$ B. $FF2_{16}$

C. $2FE_{16}$ **D.** $FD2_{16}$

14. Capacitor always blocks DC supply voltage

True   False

15. Virtual short concept is always valid for negative feedback.

True   False

16. Capacitor doesn't allow sudden change in voltage for finite value of current whereas for infinite current, it does. (True or False) Justify your answer?

17. Impose the condition on R and C, so that a first order low pass filter can act as integrator. Assume a sine wave of time period T is given as input.
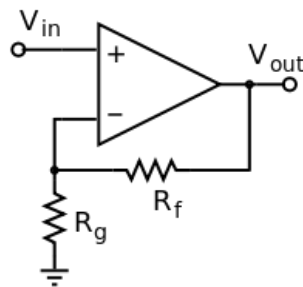
18. Calculate the close loop gain (A_{CL}), if finite open loop gain is given by (A_0 order of 100).
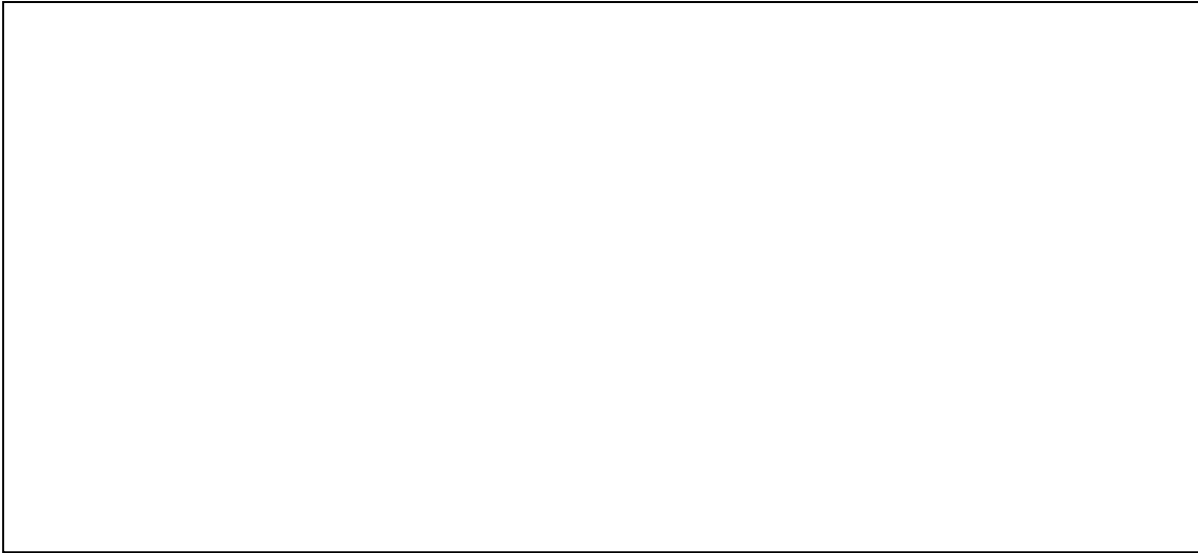
19. Implement D-latch using MUX, Transmission gate.
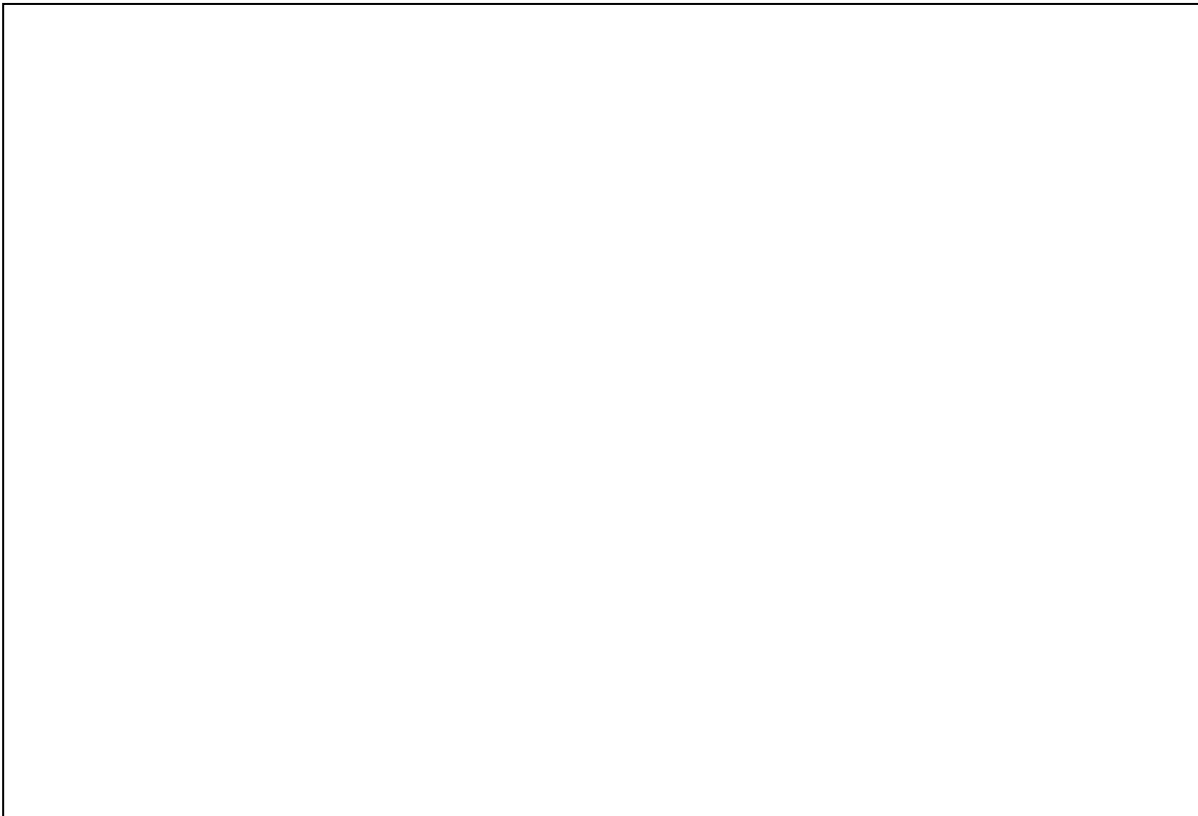
SECTION- 2: C++ and VHDL Programming

1. What will happen if in a C program you assign a value to an array element whose subscript exceeds the size of array?

   A.   The element will be set to 0.

   B.   The compiler would report an error.

   C.   The program may crash if some important data gets overwritten.

   D.   The array size would appropriately grow.

2. How many times the program will print "IndiaBIX" ?

```
#include<stdio.h>

int main()
{
   printf("IndiaBIX");
   main();
   return 0;
}
```

A.   Infinite times

B.   32767 times

C.   65535 times

D.   Till stack overflows

3.   How are the statements between BEGIN and END not evaluated in VHDL?

A.   Constantly

B.   Simultaneously

C.   Concurrently

D.   Sequentially

4. How many architectures can be associated with an entity ?

A. one or more

B. more than one

C. only one

D. None

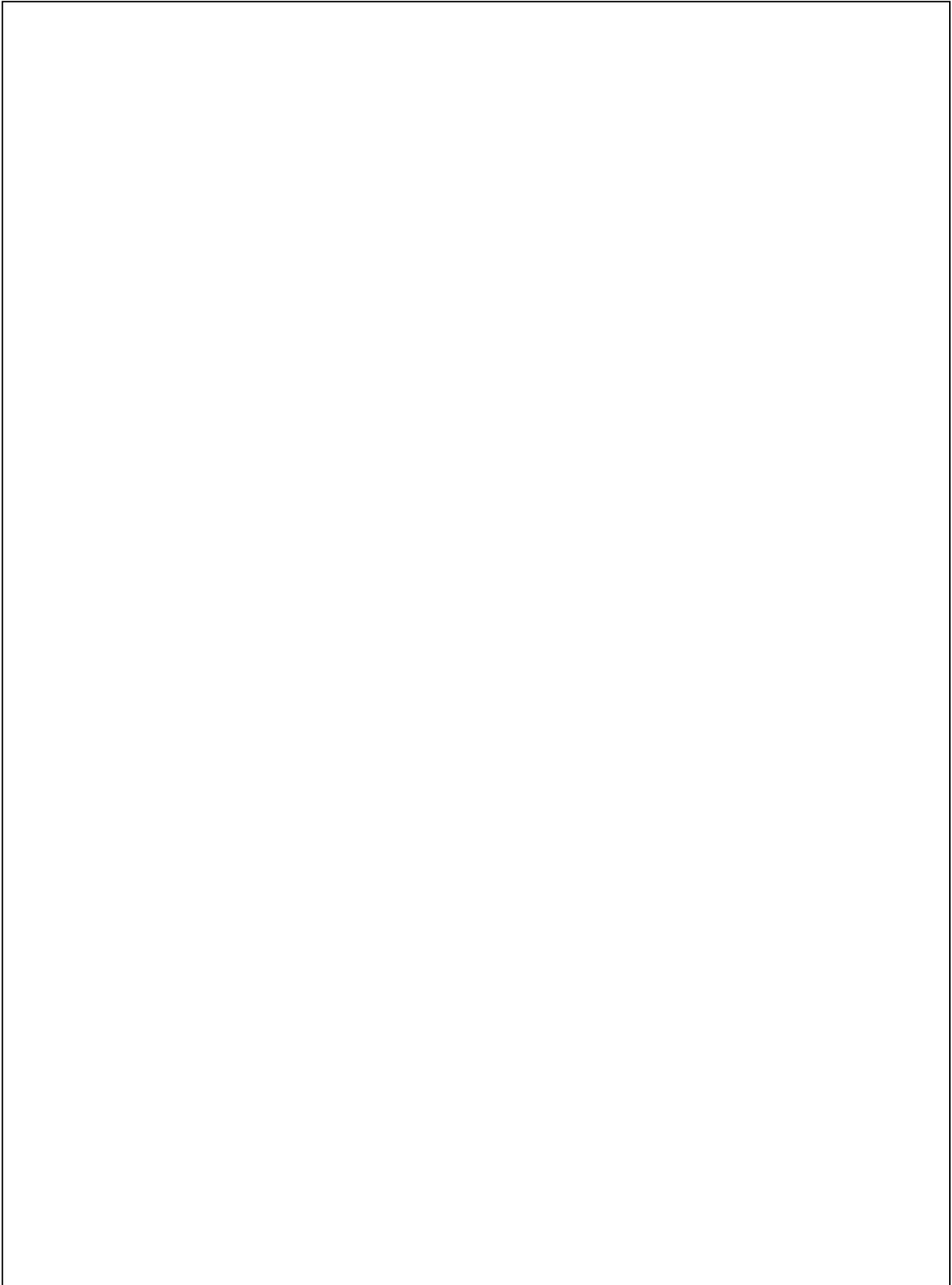5. Within the process statement, statements are executed sequentially

A. True

B. False

6. Design hardware for MOD 5 counter.

1→4→2→6→7→1

7. Write a program for bubble sort

   3, 6, 2, 9, 8, 5

1. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and

they cross each other in 23 seconds. The ratio of their speeds is:

A.   1 : 3

B.   3 : 2

C.   3 : 4

D.   None of these

2. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is :

A. $\dfrac{1}{4}$

B. $\dfrac{1}{10}$

C. $\dfrac{7}{15}$

D. $\dfrac{8}{15}$

3. If selling price is doubled, the profit triples. Find the profit percent.

A. $66\dfrac{2}{3}$

B.   100

C. $105\dfrac{1}{3}$

D.   120

4. Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ronit's age?

A.   2 times

B. $2\dfrac{1}{2}$ times

C. $2\dfrac{3}{4}$ times

D.   3 times

5. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together ?

A.   4

B.   10

C.   15

D.   16

6. An error 2% in excess is made while measuring the side of a square. The percentage of error in the calculated area of the square is:

A.   2%

B.   2.02%

C.   4%

D.   4.04%

7. If A = x% of y and B = y% of x, then which of the following is true?

   A. A is smaller than B.   **B.** A is greater than B

   C. Relationship between A and B cannot be determined.   **D.** If x is smaller than y, then A is greater than B.

   E. None of these

8. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is :

   A. $\dfrac{1}{4}$ **B.** $\dfrac{1}{10}$

   C. $\dfrac{7}{15}$ **D.** $\dfrac{8}{15}$

9. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is:

   A. $59\dfrac{7}{12}$ min. past 3   **B.** 4 p.m.

   C. $58\dfrac{7}{11}$ min. past 3   **D.** $2\dfrac{3}{11}$ min. past 4

10. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

   A. 2 : 5   **B.** 3 : 5

   C. 4 : 5   **D.** 6 : 7

S.NO	School/Graduation	University/Board	Percentage
	10th		
	12th		
	Diploma		
	B.Tech (up to 6th Sem)		

Interested to join which course and why---

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