

KATHMANDU UNIVERSITY
End Semester Examination
May/June, 2022

Marks Scored:

Level : B.E.

Year : II

Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : EEEG 214

Semester : II

F. M. : 10

Date :

SECTION "A"

[20 Q. \times 0.5 = 10 marks]

Encircle the most appropriate option.

1. Which feedback circuit increases the gain of the amplifier?
 - a. Positive feedback
 - b. Negative feedback
 - c. Both a and b
 - d. None of the above
2. Barkhausen criteria is
 - a. Positive feedback, $|\alpha \times \beta| = 0$, $\theta = 0$ or multiple of 2π
 - b. Negative feedback, $|\alpha \times \beta| = 1$, $\theta = 0$ or multiple of 2π
 - c. Positive feedback, $|\alpha \times \beta| = 1$, $\theta = 0$ or multiple of 2π
 - d. Negative feedback, $|\alpha \times \beta| = 0$, $\theta = 0$ or multiple of 2π
3. Ideally, the output voltage of a simple RC network always
 - a. Leads the input voltage by 90°
 - b. Lags the input voltage by 90°
 - c. Leads the input voltage slightly less than 90°
 - d. Lags the input voltage slightly less than 90°
4. Suppose, $R = 1K$, $C = 1\mu F$, then the output frequency of a RC phase shift oscillator is about
 - a. 50.19 Hz
 - b. 64.97 Hz
 - c. 79.17 Hz
 - d. 1 KHz
5. The voltage gain of the Wien Bridge Oscillator must be
 - a. Equal to 2
 - b. Less than 3
 - c. Greater than 3
 - d. Equal to $-\frac{1}{29}$
6. In Hartley Oscillator
 - a. Capacitors are connected in parallel with three serially connected inductors.
 - b. Inductors are connected in parallel with two serially connected capacitors.
 - c. Capacitors are connected in parallel with two serially connected inductors.
 - d. None of the above.
7. Colpitts Oscillator
 - a. Falls under the Harmonic Oscillators
 - b. Ranges from 20KHz to 300MHz
 - c. Consists of two inductors and a capacitor
 - d. None of the above
8. The output voltage of the log-amplifier is
 - a. Proportional to the logarithmic of the input voltage.
 - b. Proportional to the anti-logarithmic of the input voltage.
 - c. Linearly proportional to the input voltage
 - d. None of the above

9. In Phase Locked Loop, the output voltage of phase detector is often referred to as
 - a. Phase voltage
 - b. Free running voltage
 - c. Error voltage
 - d. All of the above
10. Resistor–transistor logic (RTL) is a class of digital circuits built using _____ as the input network and _____ as switching devices.
 - a. Resistors, Bipolar junction transistors
 - b. Bipolar junction transistors, Resistors
 - c. Capacitors, resistors
 - d. Resistors, capacitors
11. The disadvantage of RTL is that _____
 - a. It uses a maximum number of resistors
 - b. It results in high power dissipation
 - c. High noise creation
 - d. It uses a minimum number of transistors
12. The fan-out of DTL circuit is increased by
 - a. Removing a diode
 - b. Adding a transistor
 - c. Both a and b are correct
 - d. Both a and b are incorrect
13. The limitations of the one transistor RTL gate are overcome by _____
 - a. Two-transistor RTL implementation
 - b. Three-transistor RTL implementation
 - c. Multi-transistor RTL implementation
 - d. Four-transistor RTL implementation
14. A combination of TTL and Schottky diode is called
 - a. High speed TTL
 - b. DTL
 - c. Schottky TTL
 - d. Schokly TTL
15. Which of the following ICs is commonly fabricated?
 - a. Monolithic
 - b. Thin films
 - c. Thick films
 - d. All of the above
16. Oxidation is used for
 - a. Isolation
 - b. Interconnection
 - c. Doping
 - d. All of the above
17. Which of the following components cannot be fabricated in IC?
 - a. Resistors
 - b. Diodes
 - c. Transistors
 - d. Transformers
18. Astable multivibrator produces _____ at the output.
 - a. Square wave
 - b. Free running clock pulse
 - c. Sinusoidal wave
 - d. None of the above
19. For 555 astable multivibrator, if $C = 0.01 \mu\text{F}$, $R_1 = 10\text{K}$, $R_2 = 50\text{K}$ then the frequency and duty cycle will be
 - a. 1.6 KHz & 54.5%
 - b. 1.3 KHz & 54.5%
 - c. 1.6 KHz & 45.5%
 - d. 1.3 KHz & 45.5%
20. Bistable multivibrator has,
 - a. One stable state
 - b. Two stable states
 - c. No stable state
 - d. None of the above

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Level : B.E.
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Time : 2 hrs. 30 mins.

Course : EEEG 214
Semester : II
F.M. : 40

SECTION "B"
[5 Q. × 8 = 40 marks]

Attempt *ANY FIVE* questions.

Symbols have their usual meanings. Urgent appropriate assumptions are permissible.

1. a. Explain the importance of Barkhausen criteria. [4]
b. What is the effect of negative feedback on overall gain and stability? Explain. [4]
2. What is the major difference between RC Oscillators and LC Oscillators? Prove that the attenuation of RC network should be $-\frac{1}{29}$. [8]
3. a. Derive the expression of output voltage for logarithmic and anti-logarithmic amplifiers. [4]
b. Suppose V_1 and V_2 are the two input voltages, implement the op-amp and multiplier circuit to divide these input voltages. [4]
4. a. Determine the average power dissipation of a RTL inverter circuit for [4]
i. No load condition.
ii. Fan-out of 2
Assuming $V_{CE(sat)} = 0.2V, B_{BE(sat)} = 0.8V, \beta_F = 25, V_{CC} = 5V, R_C = 1K, R_B = 10K$
b. Discuss the major characteristics of logic families. [4]
5. Fabricate a diode and discuss the planner process of IC fabrication in detail. [8]
6. a. Explain the astable multivibrator and derive the frequency of oscillation. [6]
b. Discuss the internal blocks of 555 timer. [2]

