

Level : B.E.

Year : II

Exam Roll No. :

Time: 30 mins.

Course : EEEG 204

Semester : I

F. M. : 10

Registration No.:

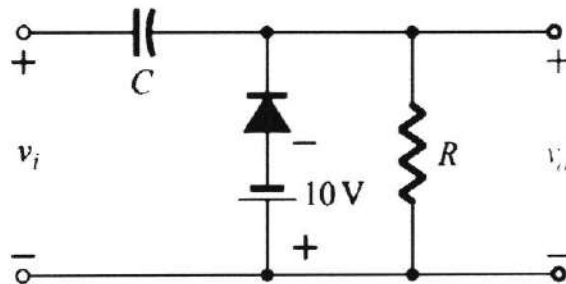
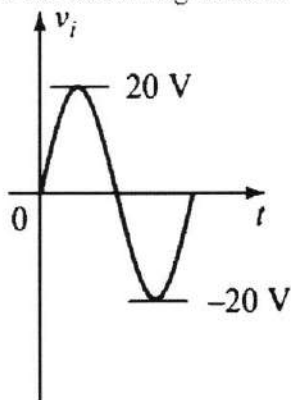
Date :

SECTION "A"

[20Q. \times 0.5 = 10 marks]

Choose the most appropriate answer. Symbols have their usual meanings.

- The depletion region in a PN junction diode is formed by:
 - Free electrons
 - Holes
 - Immobile ions
 - Majority carriers
- The Peak Inverse Voltage (PIV) rating of a diode in a rectifier circuit must be:
 - Lower than the peak input voltage
 - Equal to the peak input voltage
 - Higher than the peak input voltage
 - Zero
- V_o for following circuit:



- 30 V, -10V
 - 20 V, -20V
 - 10 V, -20V
 - 30 V, -30V
- If the peak voltage of an AC input to a full-wave rectifier is 10V, the approximate DC output voltage (assuming an ideal diode) is _____.
 - Current gain of common base configuration is:
 - 1
 - < 1
 - > 1
 - ≤ 1
 - A BJT is operating in the saturation region. What can be concluded about the voltage across the collector-emitter junction (V_{CE})?
 - V_{CE} is at its maximum value.
 - V_{CE} is close to zero.
 - V_{CE} is equal to the base-emitter voltage (V_{BE}).
 - V_{CE} is unpredictable.
 - Consider a BJT with a beta (β) of 100. If the emitter current (I_E) is 10.1 mA, the approximate base current (I_B) is _____ mA.

8. The voltage gain of a common-emitter amplifier is determined by the ratio of:
 - a. Base current to collector current
 - b. Collector resistance to emitter resistance
 - c. Collector resistance to AC emitter resistance.
 - d. Base resistance to collector resistance
9. In R-2R ladder of DAC, if input is 0110 and $V_{ref} = 16\text{ V}$, then output voltage is _____.
10. The output of a particular Op-amp increases 10V in $19\mu\text{s}$. The slew rate is _____.
 - a. 19
 - b. 171
 - c. 0.52
 - d. 0.171
11. In a summing amplifier with equal input and feedback resistors, the output voltage is:
 - a. The sum of the input voltages
 - b. The average of the input voltages
 - c. The difference of the input voltages
 - d. Zero
12. In a non-inverting Op-Amp configuration, the output signal is:
 - a. In phase with the input
 - b. 180 degrees out of phase with the input
 - c. 90 degrees out of phase with the input
 - d. Unpredictable
13. A light in a room is controlled by two switches, one at each end of the room. The light should turn on if either switch is on, but not if both are off. Which logic gate best represents this setup?
 - a. AND gate
 - b. OR gate
 - c. XOR gate
 - d. NOR gate
14. A digital circuit has three inputs: A, B, and C. The output is HIGH only when A is HIGH and either B or C is HIGH. Which Boolean expression represents this circuit?
 - a. $A + (B \cdot C)$
 - b. $A \cdot (B + C)$
 - c. $(A \cdot B) + C$
 - d. $A + B + C$
15. Given the Boolean expression: $F = A \cdot (B + C') + A' \cdot (B' + C)$. If $A=1$, $B=0$, and $C=1$, the output is _____.
16. For PMMC, if $I=1\text{A}$ and $\theta = 7^\circ$, then for 4A , $\theta =$ _____ $^\circ$
17. Variation of sensor measurements when the same quantity is measured several times is termed as:
 - a. accuracy
 - b. precision
 - c. errors
 - d. reproducibility
18. Dynamic characteristics of sensor action does not give information on:
 - a. Accuracy
 - b. Dampness
 - c. Speed
 - d. Linearity
19. A piezoelectric transducer converts:
 - a. Light to electrical signal
 - b. Mechanical stress to electrical signal
 - c. Temperature to electrical signal
 - d. Magnetic field to electrical signal
20. A key advantage of using a data logger is:
 - a. High-speed signal processing
 - b. Ability to operate without continuous human supervision
 - c. Real time control
 - d. Very high voltage amplification.

KATHMANDU UNIVERSITY
End Semester Examination
March, 2024

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

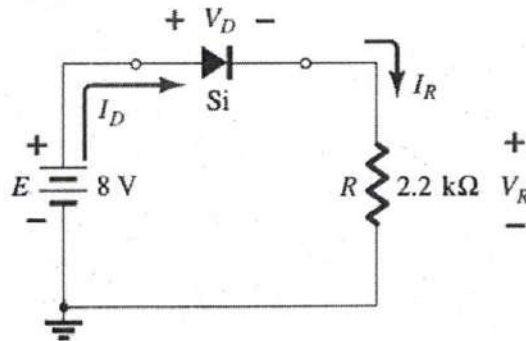
1 MAR 2025

Course : EEG 204
Semester : I
F. M. : 40

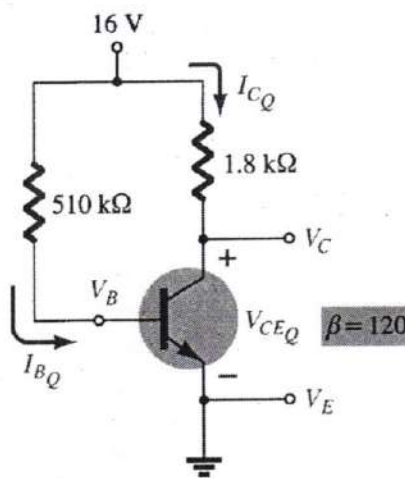
SECTION "B"

Attempt ALL the questions. Missing data may be suitably assumed. Each symbol carries their usual meaning.

- Explain the types of semiconductors. Explain the working of Zener diode as voltage regulator. [2+2]
 - Write in brief on photodiode. For the series diode configuration of figure, determine V_D , V_R , and I_D . [1+3]



- Explain common base configuration of BJT. Derive relation between α and β for BJT. [3+2]
 - For the fixed-bias configuration of Fig., determine: i. I_{BQ} . ii. I_{CQ} . iii. V_{CEQ} . iv. V_C . v. V_B . [5]



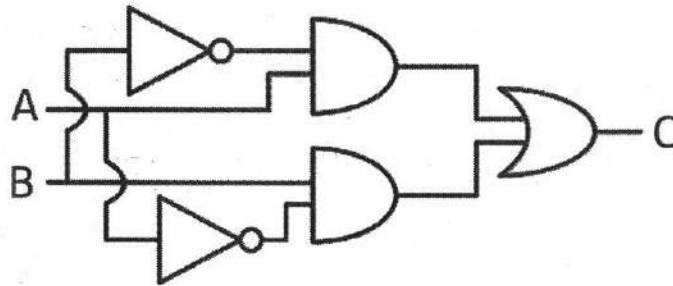
P.T.O.

3. a. Mention characteristics of ideal Op- Amp. Explain non-inverting amplifier [2+2]
deriving its gain.
- b. Explain the construction of an ideal linear DAC using op-amp as summing [4]
amplifier. Also, construct a table showing the eight analog output values for all 3-
bit binary inputs when the high signal voltage to circuit is 10V.

OR

Explain ramp type ADC.

4. a. Write symbol, Boolean expression and construct truth table for: AND and OR [3]
gate.
- b. For the given circuit with logic gates, under what circumstances would the circuit [3]
output be 1. Show the result using reference of truth table.



5. a. Explain with block diagram the components of data acquisition system. [4]
- b. Explain permanent magnet moving coil instrument. Derive relation between [4]
torque and current for moving iron type instrument.

OR

Design a system to keep a room's temperature between 25-28°C, logging data every 5 minutes.

Requirements:

- Heater ON if below 25°C, Fan ON if above 28°C.
- No simultaneous heater/fan operation.
- Use DAQ, data logger, and suitable sensors.

Task: Create a system block diagram showing sensor, signal conditioning, ADC, microcontroller/logger, and heater/fan control.