KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Marks Scored:

Level : B.E.
Year : II

Course : EEEG 204
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 13 DEC 2024

SECTION "A"

[20Q. × 0.5 = 10 marks]

Choose and encircle in the most appropriate option from each set of choices. Symbols have their usual meaning.

1. What is the main function of a diode?
   a. To store electrical energy
   b. To allow flow of current in one direction only
   c. To act as switch
   d. To amplify signals

2. A Zener diode is used as .....
   a. amplifier b. rectifier c. oscillator d. voltage regulator

3. Which of the following has maximum efficiency for rectification.....
   a. half-wave rectifier b. center-tap full-wave rectifier
   c. bridge full-wave rectifier d. both c & d

4. In which application is a rectifier diode commonly used?
   a. Signal processing b. Power supply circuits
   c. Frequency modulation d. Light detection

5. Which type of charge carrier is primarily involved in the operation of a BJT?
   a. Electrons only b. Holes only
   c. Both electrons and holes d. Neutrons

6. In an NPN transistor, which region is the majority carrier in the base?
   a. Electrons b. Holes c. Neutrons d. Ions

7. What is the current gain (β) of a BJT defined as?
   a. The ratio of collector current to base current
   b. The ratio of base current to collector current
   c. The ratio of emitter current to collector current
   d. The ratio of collector current to emitter current

8. In a transistor, the base current is about _____ of emitter current:
   a. 15% b. 5% c. 25% d. 12.5%

9. What is the typical current gain (β) range for a BJT?
   a. 1 to 10 b. 10 to 50 c. 50 to 300 d. 300 to 1000

10. In a common-emitter amplifier, if the base current is 50 μA and the current gain (β) is 100, what is the collector current?
a. 0.5 mA b. 5 mA c. 50 mA d. 500 mA

11. In an op-amp, what is the purpose of the feedback resistor in a closed-loop configuration?
a. To increase the input impedance b. To decrease the output impedance
c. To control the gain d. To provide power supply

12. The output of a particular Op-amp increases 9V in 19μs. The slew rate is _____
a. 0.42 b. 171 c. 0.47 d. 0.171

13. What is the purpose of the op-amp's offset voltage?
a. To amplify the signal
b. To adjust the output voltage to zero when the input is zero
c. To filter noise
d. To increase power efficiency

14. What is the output of an XOR gate when both inputs are the same?
a. 0 b. 1 c. Same as input d. Opposite of input

15. Which gate is known as the universal gate and can be used to build any other gate?
a. AND Gate b. OR Gate c. NAND Gate d. NOR Gate

16. The sum of products canonical forms also known as _____.

17. Which of the following is an example of a passive transducer?
a. Thermocouple b. Piezoelectric sensor
c. Photovoltaic cell d. Strain gauge

18. Which of the following is NOT a characteristic of a good measurement system?
a. High accuracy b. Low sensitivity c. High resolution d. Low noise

19. What is the purpose of a signal conditioner in a measurement system?
a. To store data
b. To convert the transducer signal into a more suitable form
c. To amplify signals
d. To display measurement results

20. Which component is essential for converting a galvanometer into an ammeter?
a. Low resistance b. High resistance c. Capacitor d. Inductor

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Semester : I
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SECTION "B"
[4 Q. × 10 = 40 marks]

Attempt ANY FOUR questions. Missing data may be suitably assumed. Each symbol carries their usual meaning.

1. a. Explain LED with applications. Find V_Q and I_D in the network shown in **figure 1**. Use simplified model. [3+3]

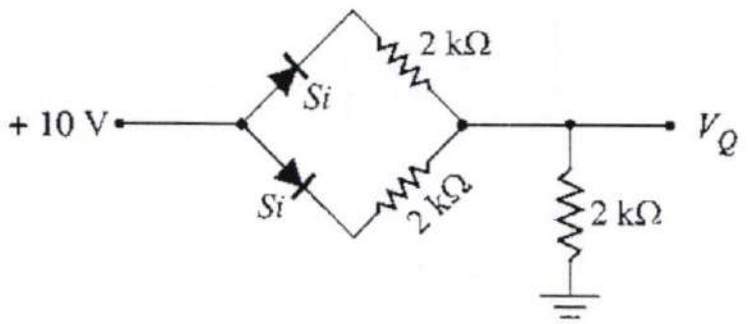

Figure 1

b. Compare half wave and full wave rectifier. [4]

2. a. Explain common collector BJT configuration. Derive relation between α and β for BJT. [3+2]

b. A transistor is connected in common emitter (CE) configuration in which collector supply is 8 V and the voltage drop across resistance R_c connected in the collector circuit is 0.5 V. The value of R_c =800 Ω. If α =0.96, determine: [5]

i. Collector-emitter voltage
ii. Base current

3. a. Explain the application of Op-amp in constructing the DAC. Explain inverting amplifier with its application. [3+2]

b. Mention a few characteristics of ideal operational amplifier. Compare it with practical one. [3+2]

4. a. Explain passive and active sensors with examples and applications. [5]

b. Explain differences in construction and applications of moving iron type and permanent magnet moving coil instrument. [5]

P.T.O.

5. a. Explain NAND gate with symbol, truth table and Boolean expression. Write a truth table and draw logic diagram for logic equation, F = X' + Y Z'. [2+2]

b. Draw a simple block diagram highlighting the use of logic gates in digital clock. [3]

c. Write truth table for given circuit. [3]