Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Level : B. E./B.Sc.
Year : II
Course : EEEG 204
Semester: I

Exam Roll No. :
Time : 30 mins.
F. M. : 20

Registration No. :
Date 05 JUN 2019

SECTION "A"
[20 Q × 1 = 20 marks]

Choose the most appropriate answer.

1. In forward region of its characteristics, a diode appears as _____.
   a. an ON switch b. an OFF switch c. a capacitor d. a high resistor

2. In a Zener diode _____.
   a. only the P-region is heavily doped b. only the N-region is heavily doped
   c. both P and N regions are heavily doped d. both P and N regions are lightly doped

3. The ac resistance of a forward-biased p-n junction diode operating at a bias voltage 'V' and carrying current 'I' is_____.
   a. zero
   b. a constant value independent of V and I
   c. V/ I
   d. ΔV/ ΔI

4. The voltage at V1 and V2 of the arrangement shown in the Figure 1 will be respectively _____.
   a. 6 V and 5.4 V b. 4 V and 6 V c. 3 V and 5.4 V d. 6 V and 3 V

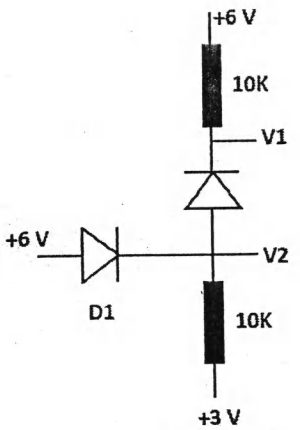

Figure 1

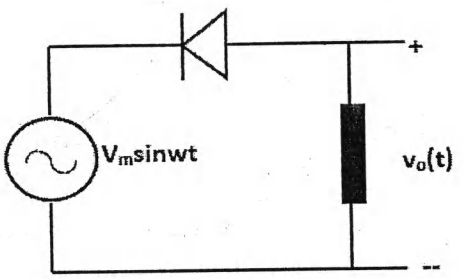

Figure 2

5. In the circuit shown in Figure 2, the average value of $v_0(t)$ will be _____.
   a. 0 b. $-V_m/\pi$ c. $-V_m/\sqrt{2}$ d. V_m/π

6. A 700 mW maximum power dissipation diode at 25°C has 5mW/°C de-rating factor. If the forward voltage drop remains constant at 0.7 V, the maximum forward current at 65°C is _____.
a. 700 mA b. 714 mA c. 1 A d. 1 mA

7. The average value of a half wave rectified voltage with a peak value of 200V is _____.
a. 63.7 V b. 127.3 V c. 141 V d. 200 V

8. I_{CBO} in a transistor can be reduced by reducing _____.
a. I_B b. V_{CC} c. I_E d. Temperature

9. In a transistor amplifier, the reverse saturation current I_{CO} _____.
a. double for every 10° C rise in temperature
b. double for every 1° C rise in temperature
c. increases linearly with temperature
d. double for every 5° C rise in temperature

10. The output impedance of a BJT under CC configuration is _____.
a. high b. low c. medium d. very high

11. An N-type FET is never operated with positive gate voltage w.r.t. the source because _____.
a. gate to source current is to be avoided b. drain current become very high
c. drain current does not increase d. none of the above

12. The pinch off voltage for a n-channel JFET is 4V, when $V_{GS} = 1V$, the pinch-off occurs for V_{DS} equal to _____ .
a. 2 V b. 5 V c. 4 V d. 3 V

13. Which one of the following statements is not correct for a MOSFET?
a. Easy to achieve higher current
b. Leakage current is relatively high
c. Have more linear characteristics
d. Overload and peak current handling capability are high

14. In a circuit, if the open loop gain is 10^6 and the output voltage is 10 volt, the differential voltage should be _____.
a. 10 μV b. 0.1 V c. 100 μV d. 1 μV

15. An ideal op-amp has a gain of -100. The input is connected to an inverting end and the input resistance is 1 kΩ. The feedback resistance is _____.
a. 100 kΩ b. 10 kΩ c. 100 Ω d. 1000 Ω

16. An analog voltage of 3.41 V is converted into 8-bit digital form by an ADC with the reference voltage of 5V. The digital output is _____.
a. 1001 1001 b. 1111 0001 c. 1011 0111 d. 1010 1110

17. The minimum number of comparators required to build an 8-bit flash ADC is _____.
    a. 8 b. 63 c. 255 d. 256

18. An SCR can be turned off _____.
    a. by passing a negative pulse to its gate
    b. by removing the gate supply
    c. by reverse biasing it
    d. by forcing the current through gate to become zero

19. The household energy meter is _____.
    a. an indicating instrument b. an integrating instrument
    c. a recording instrument d. a differentiating instrument

20. Two equal resistances, each of 100 Ω ± 1% (standard deviation) are connected in parallel. The standard deviation of the parallel combination will be _____ .
    a. 0.5 % b. $1/\sqrt{2}$ % c. $\sqrt{2}$ % d. 2 %

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SECTION "B"
[5 Q × 11 = 55 marks]

Attempt *ANY FIVE* questions. Assume any suitable data if necessary.

1.

a. Discuss working of a P-N junction diode circuit element. Name the processes involved in causing junction breakdown if it is reverse biased and explain V-I characteristics for Ge and Si diode for all regions. [1+1+3]

b. Calculate the value of V_0 and power dissipation through R_1 in Figure 1. [2]

c. The regulated load voltage in Figure 2 is provided to be 6V for all load currents, $I_L \leq 5A$.The unregulated supply varies between 8V and 10V, and the zener diode provides regulation for Iz>0, determine the series resistance Rs needed, and the power dissipation rating of the zener diode. [4]

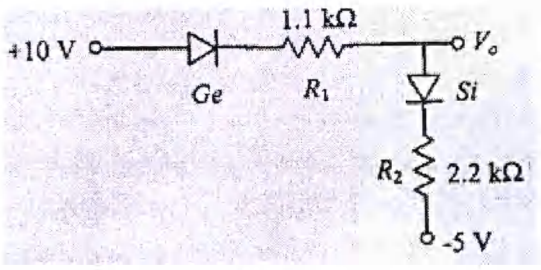

Figure 1

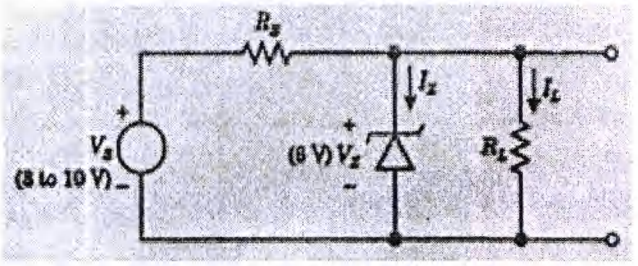

Figure 2

2.

a. Explain the significance of current amplification factors in different configuration of transistor with their relation. Explain the CB configuration of a transistor and explain the characteristics in detail. [3+4]

b. Following values are given in Figure 3;
R_b= 400 kΩ, R_c= 2.2 kΩ, V_{cc}= 30 V, and β = 120
Determine I_c, V_b and I_b. [4]

3.

a. In an SCR half wave rectifier circuit, calculate peak-load current if we measure an average (d.c.) load current of 2 A at a firing angle of 25°. [2]

b. A JFET has Vp = - 5V and I_{DSS} = 12 mA, and is used in the circuit shown in Figure 4. Find the value of V_G, V_{GS} and I_D. [4]

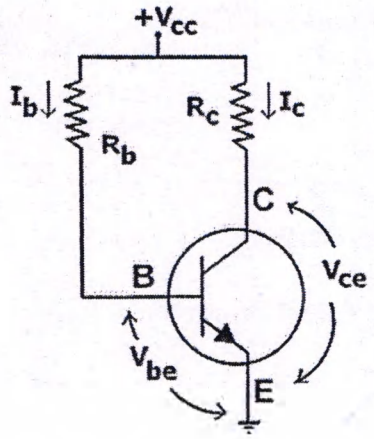

Figure 3

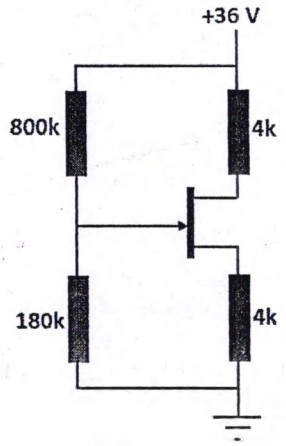

Figure 4

c. Explain the characteristics and application of n-JFET with necessary diagrams. [5]

4.

a. Explain the characteristics of ideal op-amp. How can we use it to calculate the average value of multiple input variables? Explain with necessary diagram and derivations. [2+4]

b. Find the value of output voltage of the circuit, shown in Figure 5. [5]

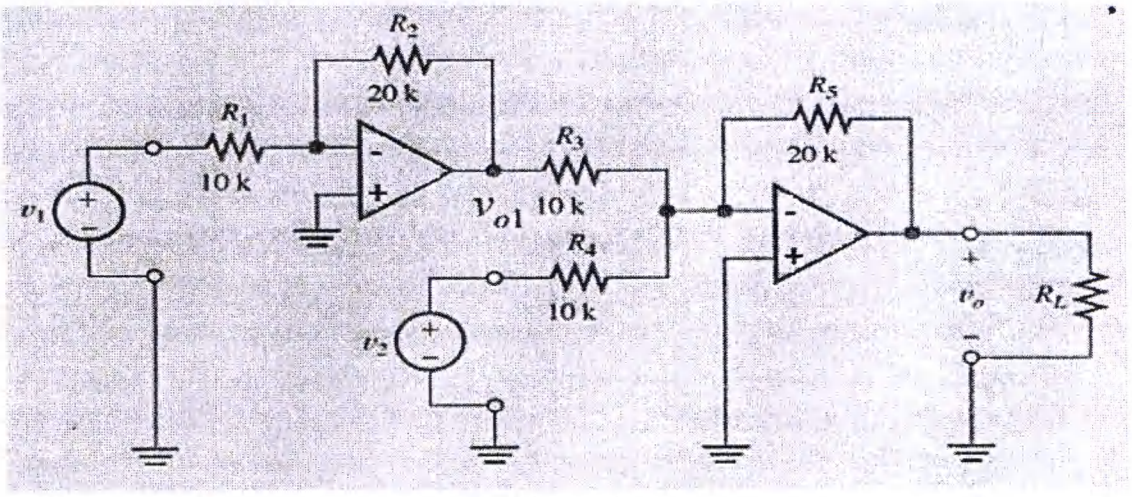

Figure 5

5.

a. Explain the detail circuit diagram and required mathematical expression of 4 bit flash ADC. The smallest resistor in a 12 bit weighted resistor DAC is 2.5kΩ, what will be the largest resistor value? [5+2]

b. What is transducer? Please explain the basic categories of the transducer. [1+3]

6.

a. Compare between diode and thyristor. [2]

b. Can we consider the saturation current maximum when V_{GS} = 0 V in D-MOSFET? Explain with appropriate reasons. [3]

c. Write short note on following topics [3+3]

i. Full wave bridge rectifier with filter circuits

ii. Energy Meter