KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2019

Marks Scored:

Level : B.E.
Year : II

Course : EEEG 204
Semester : I

Exam Roll No. :

Time : 30 mins.

F. M. : 20

Registration No. :

Date 05 MAR 2019

SECTION "A"
[20 Q × 1 = 20 marks]

Encircle the most appropriate answer.

1. In a semiconductor diode, p-side is grounded and n-side is applied a potential of -5V through a resistance of 100 ohms. The diode shall _____.
   a. conduct fully
   b. not conduct
   c. conduct partially
   d. only leakage current conduct

2. When current through a zener diode increases by a factor of 2, voltage across its terminals_____.
   a. is halved
   b. is doubled
   c. is practically unchanged
   d. increases exponentially

3. SCRs are connected in series to enhance _____.
   a. their overall dv/dt rating
   b. their voltage ratings
   c. their current handling capabilities
   d. their PIV rating

4. A given op-amp has an open loop gain of 110dB and a CMRR rating of 106 dB. What should be the open loop common mode gain of this op-amp?
   a. Infinite
   b. 4 dB
   c. 216 dB
   d. 110 dB

5. The temperature coefficient for an internal resistance of doped semiconductor is _____.
   a. always positive
   b. always negative
   c. zero
   d. positive or negative depending on the level of doping

6. n-type silicon is obtained by doping silicon with _____.
   a. germanium
   b. aluminium
   c. boron
   d. phosphorus

7. In an unbiased P-N junction, the junction current at equilibrium is _____.
   a. due to diffusion of minority carriers only
   b. due to diffusion of majority carrier only
   c. zero, because equal and opposite drift and diffusion currents for electrons and holes cross the junction
   d. zero, because no charge cross the junction

8. The number of minority carriers crossing the junction of a P-N diode depends primarily on, _____.
   a. concentration of doping impurities
   b. magnitude of potential barrier
   c. magnitude of forward bias voltage
   d. rate of thermal generation of electron hole pairs

9. A device having characteristics very close to that of an ideal voltage source is _____.
   a. op-amp b. zener diode c. transistor d. FET

10. A device formed by connecting two SCR is called, _____.
    a. rectifier b. dual rectifier c. triac d. diac

11. Typical value of input resistance of JFET is _____.
    a. 10 KΩ b. 1 KΩ c. 10 MΩ d. 100 Ω

12. In an BJT amplifier, variation in β causes _____.
    a. bias unstability b. bias stability c. gain stability d. no change

13. If β_{DC} is increased by 10%, then collector to emitter voltage drop _____.
    a. increases by less than or equal to 10% b. decreases by less than or equal to 10%
    c. increases by more than 10% d. decreases by more than 10%

14. An ideal op-amp is an ideal _____.
    a. voltage controlled current source b. voltage controlled voltage source
    c. current controlled current source d. current controlled voltage source

15. Virtual ground property of operational amplifier indicates that _____.
    a. inverting and non-inverting terminals are connected to ground
    b. inverting and non-inverting terminal are at the same potential
    c. system is at reset
    d. any one terminal is connected to ground

16. The maximum efficiency of half wave rectifier is_____ %.
    a. 33.33 b. 40.60 c. 50.00 d. 68.00

17. A bridge rectifier uses a 9 V ac input voltage. If the diodes are ideal what is the dc output voltage?
    a. 10.726 V b. -12.726 V c. 9V d. 8.1 V

18. A moving-coil permanent-magnet instrument can be used as _____ by using a low resistance shunt.
    a. ammeter b. voltmeter c. flux-meter d. ballistic galvanometer

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

20. A moving iron instrument can be used for _____.
    a. D.C. only b. A.C. only
    c. both D.C. and A.C. d. low power D. C. only

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SECTION "B"

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

1. a. Describe in your own words the conditions established by forward and reverse-bias conditions on a p-n junction diode and how the resulting current is affected. [6]

   b. The following characteristics are specified for a particular Zener diode: $V_Z = 29$ V, $V_R = 16.8$ V, $I_{ZT} = 10$ mA, $I_R = 20$ A, and $I_{ZM} = 40$ mA. Sketch the characteristic curve showing given parameters. [5]

2. a. Determine I_D, V_{D2}, and V_o for the circuit of Figure 1. [6]

   b. Describe what is doping? Explain with example, how doping alters the atomic structure of silicon. [2.5+2.5]

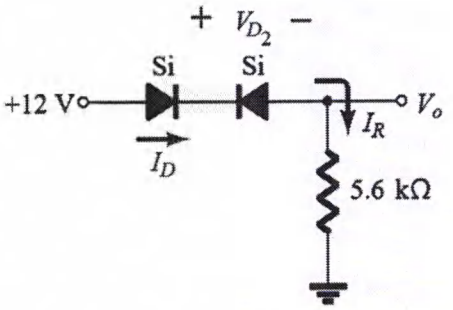

Figure 1

3. a. Determine the peak value of the output voltage for Figure 2. What is the PIV across the diode? [4]

   b. Explain in detail about the types, characteristics and application of MOSFET. [4]

   c. Explain the working mechanism and application of LVDT. [3]

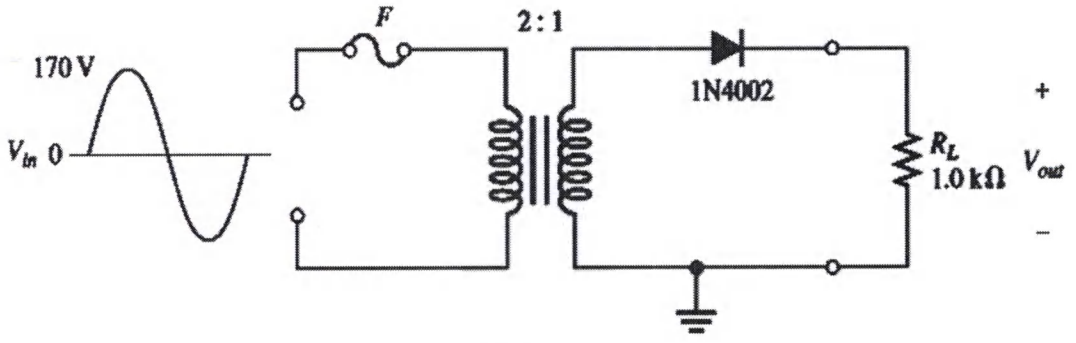

Figure 2

4. a. Show that how to connect the diodes in a center-tapped rectifier in order to produce a negative going full-wave voltage across the load resistor. [5]

b. A base current of 50 μA is applied to the transistor shown in Figure 3. The voltage of 5 V is dropped across R_C. Determine the β_{DC} of the transistor. [6]

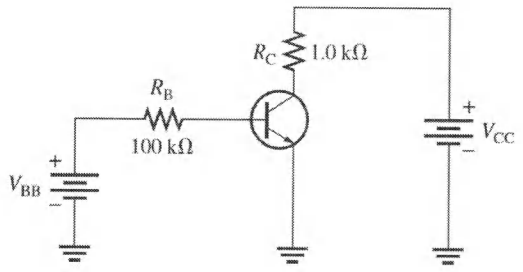

Figure 3

5. a. Calculate the output voltage expression for the circuit of Figure 4. [4]

b. Explain the characteristic of SCR? How SCR is different from diac and triac explain with example? [4]

c. Differentiate between R to 2R and Weighted Register DA converter. [3]

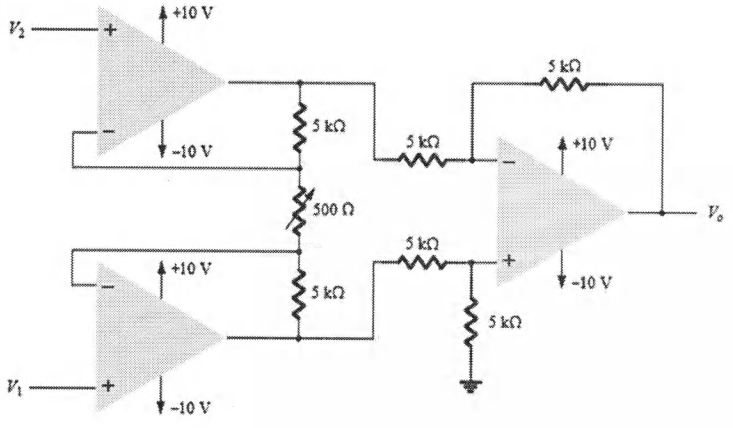

Figure 4

6. a. Differentiate moving coil and moving iron instrument. Explain in detail about the energy meter. [1+3]

b. What do you mean by transducer? Design a circuit using optical transducer and explain in detail. [1+4]

c. Explain the significance of JFET for electronic circuit design. [2]