KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level: B. E.
Year : II

Course : EEEG 204
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : MAR 0 6 2018

SECTION "A"
[20 Q. × 1 =20 marks]

Choose the most appropriate answer.

1. Valence electrons are _____.
   a. in the closest orbit to the nucleus
   b. in various orbits around the nucleus
   c. in the most distant orbit from the nucleus
   d. not associated with a particular atom

2. A trivalent impurity is added to silicon to create_____.
   a. germanium
   b. a n-type semiconductor
   c. a depletion region
   d. a p-type semiconductor

3. If the load resistance of a capacitor filtered full wave rectifier is reduced, the ripple voltage_____.
   a. is not affected
   b. increases
   c. decreases
   d. has different frequency

4. A 12 V zener diode has zener current variation of10 mA which produces a 0.1 V change in zener voltage. The zener impedance for this current range is_____.
   a. 0.1 Ω b. 100 Ω c. 10 Ω d. 1 Ω

5. For operation as an amplifier, the base of a npn transistor must be_____.
   a. 0 V
   b. negative with respect to the emitter
   c. 5 V
   d. positive with respect to the emitter

6. If I_C is 50 times larger than I_B, then β_{DC} is_____.
   a. 500 b. 0.02 c. 100 d. 50

7. In saturation mode of operation of transistor, V_{CE} is_____.
   a. 0.7 V b. equal to V_{CC} c. maximum d. minimum

8. A JFET always operates with_____.
   a. the gate to source pn junction forward biased
   b. the gate connected to the source
   c. the gate to source pn junction reverse biased
   d. the drain connected to ground

9. If the input to the circuit of figure 1 is a sine wave, the output will be_____.
   a. half wave rectified sine wave
   b. full-wave rectified sine wave
   c. triangular wave
   d. square wave

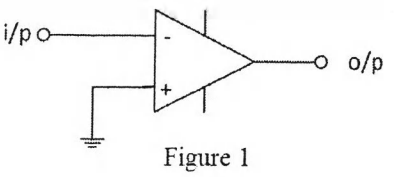

Figure 1

10. The ideal Op – Amp has the following characteristics, _____.(Where, R_i indicate input impedance, A indicate gain, R_0 indicate output impedance)
a. $R_i = \infty$, $A = \infty$, $R_0 = 0$ b. $R_i = 0$, $A = \infty$, $R_0 = 0$
c. $R_i = \infty$, $A = \infty$, $R_0 = \infty$ d. $R_i = 0$, $A = \infty$, $R_0 = \infty$

11. The dc output polarity from a half wave rectifier can be reversed by reversing_____.
a. the diode b. transformer primary
c. transformer secondary d. load polarity

12. If the line frequency is 50 Hz, the output frequency of bridge rectifier is _____.
a. 25 Hz b. 50 Hz c. 100 Hz d. 200 Hz

13. If the series resistance increases in an unloaded Zener regulator, the Zener current_____.
a. decreases b. stays the same
c. increases d. equals the voltage divided by the resistance

14. An SCR is turned off when _____.
a. anode current is reduced to zero b. gate voltage is reduced to zero
c. gate is reverse biased d. when gate voltage is maximum

15. A Triac can trigger _____.
a. only on positive gate voltage
b. only on negative gate voltage
c. either with a positive or a negative gate voltage
d. with high gate voltages

16. If the instrument has very wide full scale range, the instrument should have_____.
a. linear scale b. square law scale
c. exponential scale d. logarithmic scale

17. The full scale deflection current of an ammeter is 1 mA and its internal resistance is 100 Ohm. This is to have full deflection shown when 100 V is measured. What is the value of series resistor to be used?
a. 99.99 k Ohms b. 101.99 k Ohms
c. 99 Ohms d. 100 Ohms

18. Change in output of sensor with change in input is _____.
a. threashold b. slew rate c. sensitivity d. resolution

19. In a LVDT, the two secondary voltages, _____.
a. are independent of the core position b. vary unequally depending on the core position
c. are always in phase quadrature d. vary equally depending on the core position

20. Two voltmeters have the same range 0-400 V. The internal impedance are 30,000 Ohms and 20,000 Ohms. If they are connected in series and 600 V be applied across them, the readings are_____.
a. 360 V and 240 V b. 300 V each
c. 380 V and 220 V d. 400 V and 200 V

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SECTION "B"

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

1. a. What is a *pn* junction? How is the electric field across the *pn* junction created? Explain with the help of suitable sketch. [3]
   b. What factors must be included to more accurately represent a diode? Explain with the help of suitable example. [4]
   c. The following characteristics are specified for a particular Zener diode: $V_Z = 29$ V, $V_R = 16.8$ V, $I_{ZT} = 10$ mA, $I_R = 20$ μA, and $I_{ZM} = 40$ mA. Sketch the characteristic curve showing all the given values; also explain the significance of major parameters. [2+2]

2. a. Determine I, V_1, V_2, and V_o for the circuit shown in Figure 1. [6]
   b. Explain the working mechanism of energy meter with suitable diagram. [5]

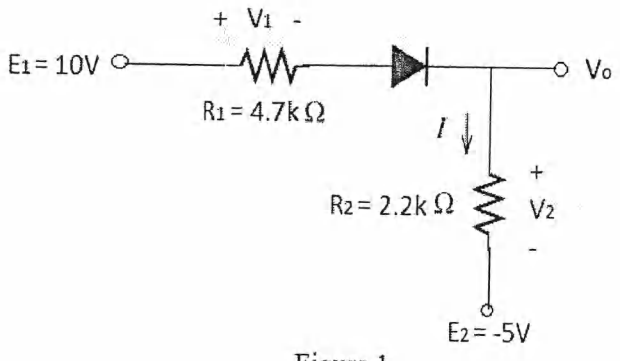

Figure 1

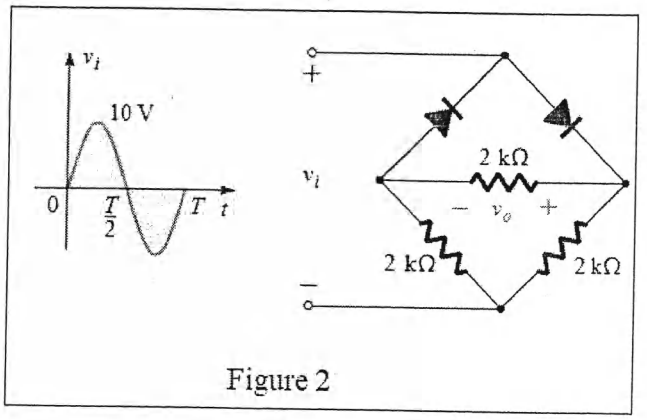

Figure 2

3. a. Determine the output waveform for the network shown in Figure 2, and calculate the output dc level and the required PIV of each diode. [4]
   b. What are the static characteristics of measuring devices? Explain the working principle of LVDT and moving iron instruments. [2+5]

4. a. Sketch an ideal family of collector curves for the circuit shown in Figure 3 for $I_B = 5$ mA to 25 mA in 5 mA increments. Assume $\beta_{DC} = 100$ and that V_{CE} does not exceed breakdown. [4]
   b. Determine whether or not the transistor shown in Figure 4 is in saturation. Assume $V_{CE(sat)} = 0.2$ V. [4]
   c. Differentiate between JFET and MOSFET. [3]

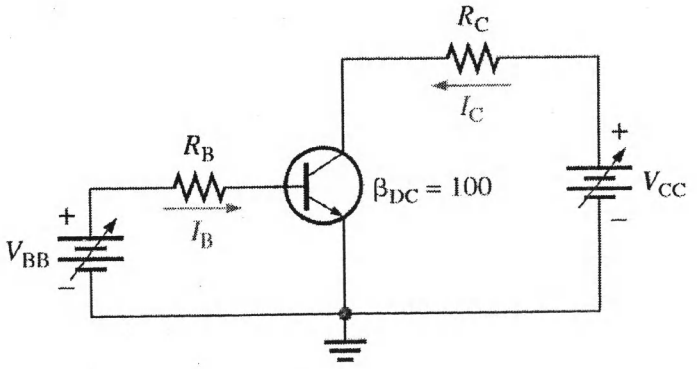

Figure 3

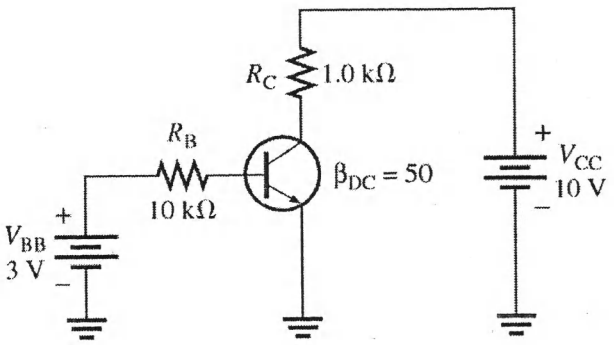

Figure 4

5. a. Explain the types, symbol, characteristics and applications of thyristors. [5]
   b. Explain the working principle of summing amplifier. Derive the output expression for the summing amplifier used to sum 5 different input values. [6]

6. a. Differentiate R to 2 R ladder and Binary weighted digital to analog converter. [4]
   b. Sketch and explain the working of circuit which convert analog signal in to 4 digit digital signal. [4]
   c. Differentiate between thermocouple and thermistor. [3]