

Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
June, 2018

Level : B. E.

Year : II

Course : EEEG 204

Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date JUN 15 2018

SECTION "A"
[20 Q. x 1 = 20 marks]

Choose the most appropriate answer.

- Which term describes the maximum expected error associated with a measurement or a sensor?
a) Accuracy b) Range c) Precision d) Resolution
- Which of the following forms of temperature sensor produces a large change in its resistance with temperature, but its nature is highly non linear?
a) pn junction sensor b) platinum resistance thermometer
c) thermistor d) thermocouple
- Resolution of a 12-bit data converter is _____.
a) 0.00024% b) 0.0041% c) 0.024% d) 0.41%
- A conductor has how many holes?
a) Many b) None
c) Only few produced by thermal energy d) Equal to the number of free electrons
- If you want to produce a p-type semiconductor, which of these would you use?
a) Acceptor atoms b) Donor atoms c) Pentavalent impurity d) Silicon
- Which process/entity helps to produce the depletion layer?
a) Doping b) Recombination c) Barrier potential d) Ions
- A transformer has a turn's ratio of 4: 1. What is the peak secondary voltage, if 115 V_{rms} is applied to the primary winding?
a) 40.7 V b) 64.6 V c) 163 V d) 650 V
- If a desired peak load voltage from a bridge rectifier is 40 V. What is the approximate rms value of secondary voltage?
a) 0 V b) 14.4 V c) 28.3 V d) 56.6 V
- If line frequency is 60 Hz, the output frequency of a half-wave rectifier is
a) 30 Hz b) 60 Hz c) 120 Hz d) 240 Hz

10. What is the PIV across each diode of a bridge rectifier with a secondary voltage of $25 V_{rms}$?
a) 35.25 V b) 25 V c) 17.68 V d) 30 V
11. The total voltage across the zener diode is the sum of the breakdown voltage and the voltage across the _____.
a) source b) series resistor c) zener resistance d) zener diode
12. If the load resistance decreases in a zener regulator, the series current _____.
a) decreases b) do not change
c) increases d) either increases or decreases
13. In the active region, the collector current is not changed significantly by _____.
a) base supply voltage b) base current
c) current gain d) collector resistance
14. A transistor acts like a diode and a _____.
a) voltage source b) current source c) resistance d) power supply
15. Increasing the collector supply voltage will increase _____.
a) base current b) collector current
c) emitter current d) no change in any current
16. An E-MOSFET with its gate connected to its drain is an example of _____.
a) a three terminal device b) an active load
c) a passive load d) a switching device
17. The minimum anode current that keeps a thyristor turned on is called the _____.
a) holding current b) trigger current
c) breakover current d) low current drop out
18. When the initial slope of a sine wave is greater than the slew rate in Op-Amp, _____.
a) distortion occurs b) linear operation occurs
c) voltage gain is maximum d) current gain is maximum
19. The non inverting amplifier has a _____.
a) large closed loop voltage gain b) small open loop voltage gain
c) large closed loop input impedance d) large closed loop output impedance
20. A D-MOSFET is considered to be a _____.
a) normally off device b) normally on device
c) current controlled device d) high power switch

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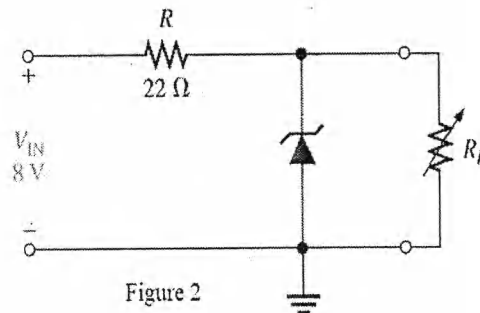
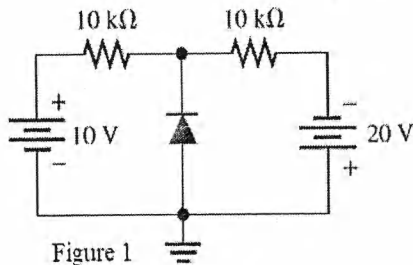
Level : B. E.
Year : II
Time : 2 hrs.30 mins.

Course : EEG 204
Semester : I
F.M. : 55

SECTION "B"
[5 Q. x 11 = 55 marks]

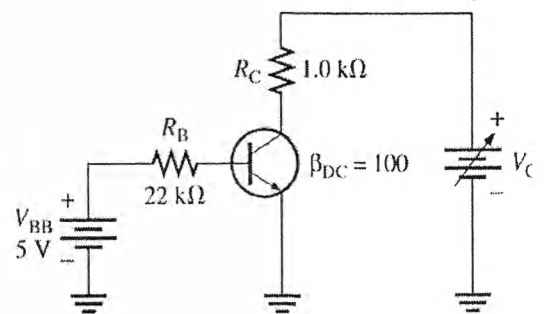
Attempt **ANY FIVE** questions. Missing data may be suitably assumed. Each symbol carries their usual meaning.

1. a) Describe in your own words the characteristics of the ideal diode and how the on and off states of the device is determined. Explain one important difference between the characteristics of a simple switch and those of an ideal diode? [3+1]
- b) Describe the difference between n-type and p-type semiconductor materials. [3]
- c) Determine the voltage across diode in Figure 1, using the complete diode model with forward dynamic resistance $r_d = 10 \Omega$ and internal reverse resistance $r_R = 100 M \Omega$. [4]



2. a) A loaded zener regulator is shown in Figure 2, $V_Z = 5.1 \text{ V}$ at $I_Z = 49 \text{ mA}$, $I_{ZK} = 1 \text{ mA}$, $Z_Z = 7 \Omega$ and $I_{ZM} = 70 \text{ mA}$. Determine the minimum and maximum permissible load currents. [5]
- b) How SCR is turned on and turned off explain with the help of characteristic curve and suitable example. [3+3]

3. a) The transistor in Figure 3 has the following maximum ratings: $P_{D(\max)} = 800 \text{ mW}$, $V_{CE(\max)} = 15 \text{ V}$, and $I_{C(\max)} = 100 \text{ mA}$. Determine the maximum value to which V_{CC} can be adjusted without exceeding a rating. Which rating would be exceeded first? [5+1]



- b) Explain the working principle and application of Strain Gauge? [2]
- c) How to extend the range of voltmeter, explain with example. [3]

4. a) Explain the working principle of various full wave rectifiers with suitable diagram. Enlist the merits and demerits of SCR based full wave rectifier. [4+2]
- b) For a certain D-MOSFET, $I_{DSS} = 10 \text{ mA}$ and $V_{GS(off)} = -8 \text{ V}$ Determine, [3]
- is this an n-channel or a p-channel MOSFET?
 - Calculate I_D at $V_{GS} = -3 \text{ V}$
 - Calculate I_D at $V_{GS} = 3 \text{ V}$.
- c) Write down application of JFET and MOSFET. [2]
5. a) Distinguish between input bias current and input offset current of Op-Amp. How long does it take the output voltage of an op-amp to go from -10 V to $+10 \text{ V}$ if the slew rate is $0.5 \text{ V}/\mu\text{S}$? [4]
- b) Compare the characteristic of diac and triac. [2]
- c) Explain how '1011' four bit digital data is converted in analog signal using R to 2R ladder. [5]
6. a) Calculate the output voltage (including polarity) for the circuit shown in Figure 4. Use following values of V_X and V_Y ; [5]
- $V_X = 1.5 \text{ V}$ and $V_Y = -1 \text{ V}$
 - $V_X = -2 \text{ V}$ and $V_Y = -1.5 \text{ V}$
 - $V_X = 8 \text{ V}$ and $V_Y = 10 \text{ V}$.
- b) Find the output value of analog signal using 3 bit flash ADC. [6]
- Assume the following values, $V_{ref} = 10 \text{ V}$, $R = 100 \Omega$ and $V_{in} = 7 \text{ V}$.

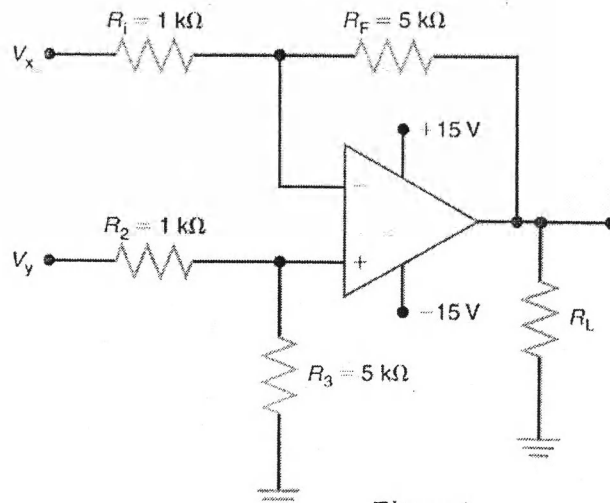


Figure 4