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F.E. (Sem-II) (Revised Course 2016-17)
EXAMINATION Nov/Dec 2019
Fundamentals of Electronics and Telecommunication Engineering

[Duration : Three Hours]

[Total Marks : 100]

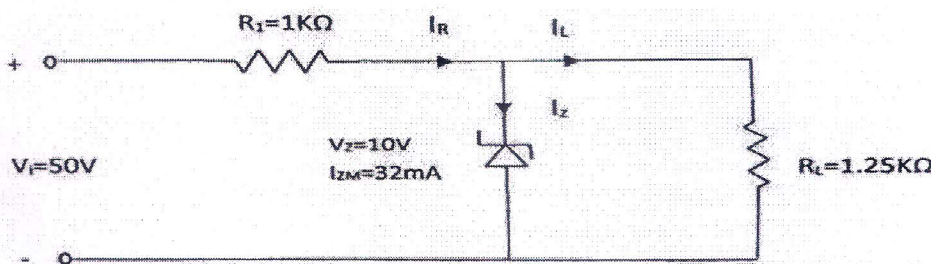
Instructions:

1. Answer five questions. At least two from Part-A, two from Part-B and one from Part-C.
2. Assume suitable data if necessary.
3. Figures to the right indicate full marks.

PART- A

Answer any two questions from the following:

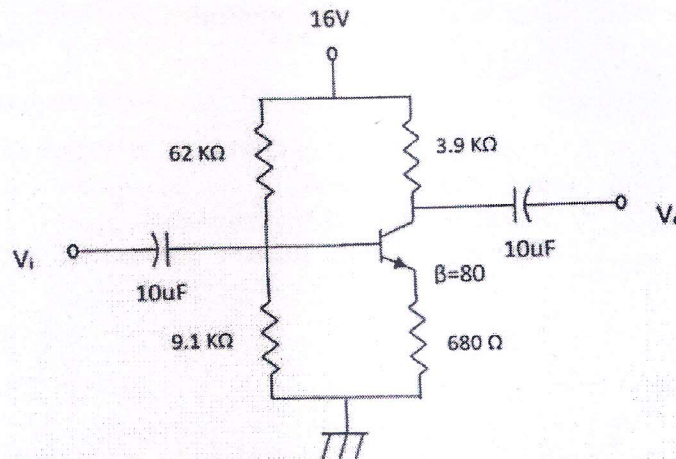
- 1
 - a) Draw a reverse biased PN junction diode and explain the following terms: 6
 - i) Reverse Breakdown Voltage
 - ii) PIV of a diode
 - b) With the help of neat diagrams explain the working of a centre-tapped full wave rectifier. Derive the expression for Ripple Factor. 8
 - c) For the network below determine if the Zener Diode is ON or OFF. Find the values of V_L , V_Z , I_L and P_Z . 6



- 2
 - a) Derive the relation between current gain of common-base configuration (α_{dc}) and current gain of common-emitter configuration (β_{dc}) for a transistor. 4
 - b) Explain the input characteristics of an NPN BJT connected in Common Collector configuration with the help of a neat diagram. 5
 - c) What is the need for biasing a transistor? 6

- d) Determine the operating point for the following network.

5



3

- Explain the construction and working of a Light Emitting Diode.
- With the help of neat diagrams explain the working of an n-type enhancement MOSFET.
- With the help of a neat diagram explain how CMOS can be used as an Inverter.

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PART-B

Answer any two full questions from the following:

4

- Explain the construction and operation of a silicon-controlled rectifier.
- State and prove De Morgan's laws using a logic diagram and truth tables.
- Draw the pin diagram of the IC 741 op-amp and explain the function of each pin. Explain the operation for a sinusoid input signal applied to the inverting terminal of an op-amp, and draw the output waveform.

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- What is an LVDT? With neat diagrams explain the internal construction and working principle of an LVDT. List two applications.
- Draw the basic block diagram of a PLC and explain its principle of working.

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- 6
- c) With the help of a neat diagram explain the components of a basic communication system. 6
- a) Why is a NAND gate called a “universal logic gate”? Using logic diagrams, implement the following logic gates using only NAND gates: 6
- i) OR ii) AND
- b) Why is modulation needed in communication systems? With the help of a diagram, explain the basic concept of amplitude modulation. 6
- c) What is a strain gauge? Define “gauge factor” of a strain gauge and write the expression for it. 4
- d) Reduce the following Boolean expression and implement the simplified expression using logic gates: 4

$$Y = \bar{A}\bar{B} + A\bar{B}$$

Verify using a truth table.

PART-C

Answer any one full question from the following:

- 7
- a) Explain the limits of operation for a transistor. 5
- b) Simplify the following expression using laws of Boolean algebra: 6
- i) $Y = ABC + B\bar{C}D + \bar{A}BC$
- ii) $Y = \bar{A}BC\bar{D} + B\bar{C}\bar{D} + B\bar{C}\bar{D} + B\bar{C}D$
- c) Draw waveforms for the modulating and modulated signals for FM, and define modulation index for the same. 4
- d) Draw and explain the Ideal Voltage transfer Curve for an Op-amp. 5
- 8
- a) Draw and explain the Drain-Source characteristics of the n-channel JFET. 5
- b) Draw the block diagram of a microcontroller and list two applications. How is it different from a microprocessor? 7
- c) Compare the Common Base, Common Emitter and Common Collector BJT configuration with respect to the following characteristics: 8

- i) Input Resistance
- ii) Output Resistance
- iii) Voltage Gain
- iv) Current Gain
- v) Phase relation between Input and Output

Based on the above characteristics, which configuration is best suited to work as an amplifier?