Total No. of Printed Pages:04

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.

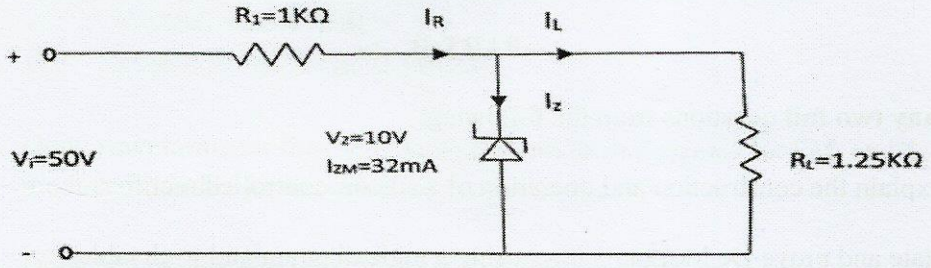
PART- A

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**

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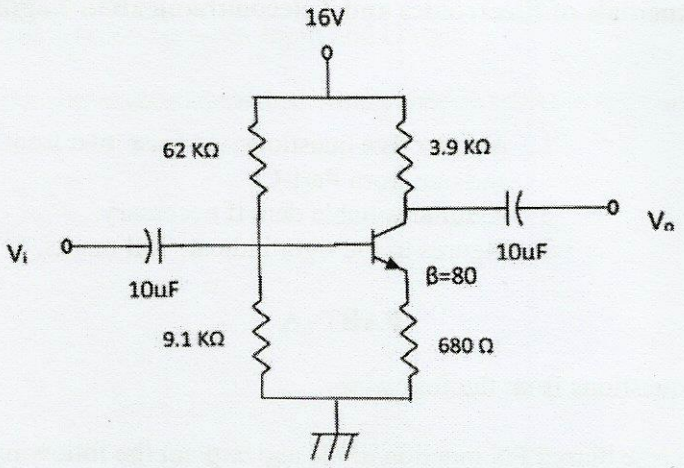
d) Determine the operating point for the following network. 5



3 a) Explain the construction and working of a Light Emitting Diode. 7

b) With the help of neat diagrams explain the working of an n-type enhancement MOSFET. 7

c) With the help of a neat diagram explain how CMOS can be used as an Inverter. 6

PART-B

Answer **any two full** questions from the following:

4 a) Explain the construction and operation of a silicon-controlled rectifier. 6

b) State and prove De Morgan's laws using a logic diagram and truth tables. 6

c) 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. 8

5 a) What is an LVDT? With neat diagrams explain the internal construction and working principle of an LVDT. List two applications. 8

b) Draw the basic block diagram of a PLC and explain its principle of working. 6

c) With the help of a neat diagram explain the components of a basic communication system. 6

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) $Y=\bar{A}BC\bar{D}+BC\bar{D}+B\bar{C}\bar{D}+B\bar{C}D$

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?